THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY,

INCLUDING

ZOOLOGY, BOTANY, AND GEOLOGY.

(BEING A CONTINUATION OF THE 'MAGAZINE OF BOTANY AND ZOOLOGY,' AND OF LOUDON AND CHARLESWORTH'S 'MAGAZINE OF NATURAL HISTORY.')

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"Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ:—ex harum usu *bonitas* Creatoris; ex pulchritudine *sapientia* Domini; ex œconomiâ in conservatione, proportione, renovatione, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper æstimata; a vere eruditis et sapientibus semper exculta; male doctis et barbaris semper inimica fuit."—LINN.

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THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

"................. per litora spargite muscum,
Naiades, et circùm vitreos considite fontes:
Pollice virgineo teneros hìc carpite flores:
Floribus et pictum, divæ, replete canistrum.
At vos, o Nymphæ Craterides, ite sub undas;
Ite, recurvato variata corallia trunco
Vellite muscosis e rupibus, et mihi conchas
Ferte, Deæ pelagi, et pingui conchylia succo."
Parthenii Ecl. 1.

No. 74. JULY 1843.

I.—*Notice of the Life and Labours of* DeCandolle: *extracted [and translated] from the Address delivered before the Royal Botanical Society of Ratisbon, at its meeting on the* 28*th of November* 1841, *by the President* Prof. von Martius*.

Augustin Pyramus DeCandolle, Professor of Botany at Geneva, died on the 9th of September 1841. DeCandolle exerted such an extensive and powerful influence upon the progress of botany, that he is identified with the history of the science in the present century.

The man who impressed the seal of his genius on the natural history, and especially on the botany of the last century, Linnæus, died at Upsal on the 10th of January 1778. On the 4th of February of that same year, twenty-five days after the departure of Linnæus, and on the same day upon which the death of Conrad Celtis occurred, Aug. Pyramus DeCandolle saw the light of day at Geneva. Thus did the spirit of the times, which guides the wisdom of man, transfer the *rôle* of the systematical classifier of plants from Sweden to the verdant shores of the Leman, and place it in the cradle of him, upon whose urn we now suspend the flower-garland of grateful reverence.

"Scilicet a tumulis, et qui periere propinquis,
Protinus ad vivos ora referre juvat."
Ovid, Fast. II.

* We give this memoir as it has appeared in Silliman's Journal for last April, not doubting that it will greatly interest our readers. The initials affixed we conclude to be those of Dr. Asa Gray.—Ed. *Ann. Nat. Hist.*

DeCandolle was without doubt the Linnæus of our age. In the right understanding of what he has accomplished, lies the true measure both of his own greatness and of the work done by his predecessor,—lies the sum of the progress which botany has made since the departure of Linnæus from the scene of his activity. The importance of systematic arrangement and classification was the leading idea in both their minds; and consequently both have been especially useful as *registrators* of the vegetable kingdom. Both, however, were influenced and guided by the ideas of vegetable physiology and morphology which each had formed. The systematic works of both, therefore, went hand in hand with their general views, received from them their impulse and signification, and reflected back the spirit which distinguishes their different epochs. They are accordingly as different in their manner of comprehending and of carrying out their ideas, as were the fundamental principles respecting the nature of plants which prevailed in the time of each. There is, however, this essential difference between them. The thoughts which Linnæus embodied in his system were his own creation. DeCandolle, on the other hand, adopted the ideas of the French school, founded on the natural method of A. L. de Jussieu, with the view to their full development in an universal descriptive system of the vegetable kingdom. We do not at present propose fully to trace the parallel between Linnæus and DeCandolle, although some of its elements will be indicated in the brief sketch of the life and labours of our much-lamented friend: but it remains for the historian of botany to exhibit in detail the relations which these two men sustained to each other, and to the epochs in the progress of the science distinguished by their names.

Aug. Pyr. DeCandolle sprung from a noble family of Provence, which, from religious considerations, removed to Geneva in the year 1558. The younger Catholic branch of the family, still existing in Provence, is now represented by the Marquis DeCandolle, with whom the Genevan botanist always maintained the friendly relations of kindred. Augustin DeCandolle, the father of our departed friend, was one of the first magistrates (premier syndic) of the republic of Geneva. In the early years of his life, the feeble health of the child gave much anxiety to his parents. In his seventh year he suffered from an attack of acute hydrocephalus; but fortunately conquered a disease so often fatal to childhood, or which in other cases so frequently leaves behind a feebleness of the mental powers. But the youth and man, with his well-organized head, fitted for the most difficult processes of thought, experienced no further ill effects from this distressing malady.

In the gymnasium (*collège*) he was not distinguished, except

for his proficiency in Latin and French versification. By the time he reached the first class, in the year 1791, he had gained many prizes by his great facility in versification and his uncommonly retentive memory. At this period, when his body and mind were proportionally and very rapidly developed, he entered into the "belles-lettres class," a division which answers to the German *lycealcursus*, or highest department of the gymnasium. The Revolution about this time (1792) overflowing the limits of France, extended itself into Switzerland; the government of the canton of Geneva was overthrown; and the father of our DeCandolle retired to an estate which he possessed in Champagne, a village near Grandson, between Yverdun and Neuchâtel. The young man had until now devoted himself almost exclusively to classical studies. He had read the great Latin and Greek authors diligently, and with good effect on the development of his judgement; he had written many essays in French and Latin verse, and knew by heart a great number of classical passages from the literature of these languages. Even at the time of his leaving college, his memory retained so perfectly the first six books of the Æneid, that he could go on with the recitation of any portion of them taken at random without hesitation. The study of history was peculiarly attractive to him, and for a long time he regarded himself as destined to the profession of an historian.

Somewhat later he attended to the lectures of Pierre Prevost on philosophy. Logic from the lips of this celebrated natural philosopher, the author of the valuable treatise on the equilibrium of caloric, had a powerful influence on his excitable mind. It gave him the habit of acute and clear thinking, and was an excellent introduction to the different exact sciences, with the study of which he was employed in the years 1794 and 1795. Physics, the department of Marc. Aug. Pictet, had more attraction for him than mathematics.

Meanwhile his residence in the country, where he was accustomed to pass his vacations, had brought him nearer to nature. Without any book on botany, following the guidance simply of the objects themselves, he accustomed himself to the art of observation. At first this occupation had only the character of a pastime or recreation. What afterwards suddenly induced him to devote himself wholly to the "amabilis scientia," was the excitement which he experienced in 1796 in the lecture-room of the excellent Vaucher*.

The number of teachers at the Academy of Geneva was at that

* [The teacher survived for about a year his more celebrated pupil An interesting biographical notice of M. Vaucher, from the pen of Alphonse DeCandolle, has recently been published in the 'Bibliothèque Universelle' at Geneva, an English translation of which appeared in the 'Annals and Magazine of Natural History' for November and December last.—A. G.]

time very small. M. P. Vaucher, professor of theology, who soon after proved himself an accurate observer by his account of the Confervæ of fresh water, was giving in that year a free course on botany. DeCandolle had only heard the first half of the course, when he returned to his parents at Champagne, determined to devote himself exclusively to this science. The attractive descriptions of Vaucher had revealed to him his own genius; and he chose at the age of eighteen the vocation to which he remained faithful during his whole life, with an enthusiasm which did not desert the man of sixty-three even on his death-bed. In these lectures he had become acquainted with the organs of plants. Returning to the country, he began at once to describe the plants which he found, indicating them by their common, not their scientific names, of which he was at that time ignorant. He considered himself fortunate a few months afterwards, when he received the first edition of Lamarck's 'Flore Française' and a few other botanical books, whose true value he immediately understood.

It was the custom at that time, in his native city, for the sons of rich parents to study law. DeCandolle consequently began this study in the year 1796, but with the fixed intention of not allowing it to affect his future destination. One of his friends, who was closely connected with Dolomieu, induced him to pass the winters of 1796 and 1797 in Paris, under the eye of that celebrated observer of nature. He received his father's permission for this and lived in the house of Dolomieu, by whom he was treated with paternal tenderness. He now attended the lectures of Vauquelin, Fourcroy, Charles, Portal and Cuvier. In the Jardin des Plantes he had made the acquaintance of Lamarck, Deleuze and Desfontaines. To the latter his heart was peculiarly drawn. The gentle repose of this learned and amiable man enchained him as to a second father*, and he preserved to his latest breath the most tender and grateful affection as well for him as for Vaucher. These winter sessions had opened to him a view into the depth and extent of natural science. He perceived the importance of the relations between physics, chemistry and botany; he perceived that the latter science had reached a station where she required especially for her completion the aid of the others. He determined to labour in this field, and to help to bring botany out of her isolated position. This was besides the peculiar task of the period. The labours of our great M. von Humboldt, of Priestley, of Ingenhauss, &c. had extended the domain of botany in a similar direction. Accordingly he came out first with

* DeCandolle honoured the memory of his friend, who died on the 16th of November 1833, by a "Notice Historique sur la Vie et les Travaux de M. Desfontaines," in the 'Bibliothèque Univers.' Feb. 1834.

his treatise upon the nourishment of Lichens, which, in the summer of 1797, was laid before the Société de Physique et d'Histoire Naturelle, then recently established by Saussure at Geneva. His intercourse with Senebier and Vaucher confirmed him in this direction of his faculties. It is easy to perceive, that, in the whole course of his literary labours, he sought to make the doctrines of physics and of chemistry available in their application to botany. We find the same spirit in his excellent treatise 'Sur les Propriétés Médicales des Plantes' (Paris, 1804, 4to), of which Perleb has given a German version (1810) enriched with many valuable additions. He attempted in this work to represent more fully than had been before done, the parallel suggested by Linnæus, but opposed by other writers, between the outward forms of plants and their chemical constitution and adaptation to pharmacy; a labour in which he manifested a happy talent for tracing back various phænomena to their origin in general principles.

In the year 1798 Geneva was incorporated into the French republic. DeCandolle, finding his future prospects much affected by this event, the property of his parents having been materially diminished by the catastrophes of the Revolution, determined to adopt the medical profession, and easily obtained the consent of his father, who hoped that he would be thus established in a lucrative mode of life. The son, meanwhile, whose enthusiasm for botany had increased from year to year, thought principally of the greater facilities he should thus enjoy for the pursuit of his favourite science. During this year he went the second time to Paris; and taking up his abode in the neighbourhood of the Jardin des Plantes, he gave himself up with zeal to the study of its accumulated treasures. Lamarck encouraged him to labour with him in the botanical portion of the 'Encyclopédie Méthodique,' in which he wrote the articles *Parthenium* and *Lepidium*. He also assisted Lamarck in the preparation of the article on *Panicum,* Poiret in that on *Paspalum,* described the species of *Senebiera,* and published his treatise on Lichens. At the request of Desfontaines he undertook the preparation of the text for the 'Plantes Grasses,' which Redouté had begun to represent in a splendid iconographical work. He received on this occasion the most friendly assistance from Desfontaines and L'Héritier, who gave him the free use of their rich collections and invaluable books. If neither this work, nor that on the *Liliaceæ,* which Redouté published somewhat later (also with the assistance of DeCandolle), nor the *Astragalogia* published in 1802, merit the praise of exact analytical descriptions of individuals, such as science now demands of *monography,* yet they already foreshow the facility and acuteness of systematic comprehension which so fully characterize DeCandolle's later efforts.

At this period he contracted a close friendship with the noble-minded Benjamin De Lessert, a man always open to everything great and useful. The two friends glowed with the purest enthusiasm for the benefit of their fellow-men. They founded the Société Philanthropique, whose first operation, during a time of public necessity, was the distribution in Paris of the Rumford soup. DeCandolle was during ten years the secretary and an active member of that benevolent society. At this time he brought to maturity another institution of a similar tendency, which is still flourishing, viz. the Société d'Encouragement pour l'Industrie Nationale; he drew up the statutes for this society, and assisted until the year 1807 in preparing the bulletins issued by it. His activity in this field of philanthropy was maintained and enlarged by his intercourse with many distinguished men of similar views, such as the geometrician Lacroix, Biot, Cuvier and the elder Brongniart. About this time he received the visit of two of the most distinguished citizens of the department of the Leman, who requested him to join them, in order to represent the interests of the department in a union of his *Notables,* which the First Consul had summoned. He accompanied them to the Tuilleries. Bonaparte inquired for the representative from Geneva, and turning to DeCandolle endeavoured to obtain from him the declaration that Geneva found herself happy in her union with the French republic. But courtesy could not bring the son of the Genevan magistrate, an upright friend to his country, to make an obsequious reply.

In the year 1802 DeCandolle married Mademoiselle Torras, the daughter of a Genevan then resident in Paris. This marriage, founded on mutual affection, and made happy by love and harmony, gave him three children; of whom only one son survived the father. In the same year he was called to be *professor honorarius* in the Academy at Geneva, but did not yet engage in its duties. He remained in Paris instead, and gave at the Collège de France, in Cuvier's place, his first course on botany.

Benjamin De Lessert had purchased, in the year 1801, the rich and very interesting herbarium of the Burmann family. The duplicates he presented to his friend DeCandolle; and the latter afterwards acquired the equally rich collection of plants made by L'Héritier, who had fallen a victim to assassination. These were the foundation of the immense herbarium which DeCandolle increased, during his active life, to the number of from seventy to eighty thousand kinds, and which may be regarded not less for its copiousness than on account of its exemplary order, and the rich variety of original specimens communicated by all the distinguished botanists of our times, as one of the greatest treasures in natural science of all Europe.

At the same time DeCandolle began the preparation of his 'Flore Française'; which, although announced as a second edition of the work by Lamarck under the same title, should be regarded as exclusively the production of DeCandolle, since Lamarck gave to it only his name and the use of his collections. Many years were employed in the collection of materials for this work in all the provinces of France. The author had opened a correspondence with all the botanists of the country, especially with Nestler, Broussonet and Balbis, as well as with many foreign students of nature,—with Vahl, Pallas, Willdenow, Jacquin, the younger Hedwig and others, and made repeated journeys throughout France. This work, a truly great one, embracing a region rich in plants, was the first flora arranged according to the principles of the 'Méthode Naturelle.' The introduction to it, which exhibits a clear and orderly conception of nature, was DeCandolle's first attempt to give a scientific representation of this theory. It met, as well as the annexed 'Clavis Analytica,' with the greatest approbation. The work, the sale of which in the year 1804 had already reached to four thousand copies, is now quite out of print. It is the first book which has appeared in France in which we Germans find a satisfactory account of Cryptogamous plants resting on actual personal examination, a class of plants which had been before much neglected in France. The masterly manner in which an immense mass of materials has been treated,—the exactness with which the descriptions are given in a luminously technical style, whilst at the same time more is said of the geographical situations of plants than has been usually the case,—stamp this 'Flore Française' as a work of great merit. With this alone would DeCandolle have fulfilled his obligations to the public, had he written absolutely nothing else. So thorough a production could not but meet with acknowledgement by the French government. Such men as Chaptal and Lacepède knew how great an influence on the national welfare a thorough knowledge of the vegetation of the country would exert. He received accordingly a commission in 1806 to travel through France and the kingdom of Italy, and to study these countries in a botanical and agronomical point of view. For six years he made a journey each summer, and gave an account of his observations to the Minister of the Interior. In these official reports he described the peculiarities of the district of country, noted the modes of culture in use, and presented plans for their improvement. He neglected no occasion to bring forward unobserved truths. His noble independence of character often led him to protest against faults in government, on which occasions he did not limit himself to his immediate commission. Some of these official reports have appeared

from the press. He had at the same time formed a plan of preparing an extensive statistical work upon the condition of farming and of everything connected with it, which he would probably have completed, accustomed as he was to give to his plans the fullest development, if the political catastrophe of 1814 had not directed his activity into new channels. Only a few portions of that work were completed by him. One result of these journeys was the very valuable supplement, in a botanical point of view, to his 'Flore Française.' Meanwhile he had been called, in the year 1807, to the professorship of the medical faculty at Montpelier. He repaired thither a few years later (1810) to take possession of the professorship of botany in the philosophical faculty (*faculté des sciences*) which was then created. He received the direction of the botanical garden, the collections of which he soon doubled. His active spirit animated the scholars, who flocked thither in great numbers. Since Magnol, the chair of botany at Montpelier had never exercised so favourable an influence on the academic youth. The clearness, fullness and elegance of his style, the practical bearing which he gave to his teachings, with the genial serenity and freshness of his character, which united the glow of the Provençals with the serious diligence of the Swiss,—who could withstand such qualities? His ready talent for extemporaneous discourse, and the spirit and grace which he threw into his lectures, made his science charming even to women. Even if what passes by the name of botany among the fair sex in France and Switzerland be not precisely *his science,* yet it may be deemed a proof of his influence, that in those countries a knowledge of plants is regarded as almost as essential an element in the education of women as that of music with us sound-loving Germans.

One result of his academical labours at Montpelier, of great interest for the scientific public, was the publication of his 'Théorie Elémentaire de Botanique'; the first edition of which appeared in 1813, the second in 1816. This book put into circulation a host of new and sound ideas in vegetable morphology and physiology. His talent for generalization is manifest throughout this work, often leading him, indeed, into by-ways, which however, like every excursion of the true inquirer, tend to bring him ultimately to a higher point of view. Two doctrines, here for the first time propounded in a scientific connexion, that of the confluence or union of organs (*soudures*), and that of their unequal development or suppression (*avortemens*), have become, under certain points of view, canons in observation. It may be said in general of the theoretical views of DeCandolle, that they differ in many respects from those of Linnæus, and often justly supersede them, because they are founded on broader and more physiological premises. I

do not stop to point out these differences. It would be necessary to enter deeply into their respective modes of thinking, to do justice to either of these eminent inquirers into nature.

DeCandolle's views approach more nearly, on the whole, to those of Gœthe; but it is not to be thence inferred that he was essentially aided by our great poet in the development of his ideas. Even in Germany, it was long before we understood Gœthe's object in his doctrine of metamorphosis. But when DeCandolle was informed of the powerful impression which these views had made on our minds in Germany, he caused Gœthe's book to be translated and studied it diligently. In his later and larger work ('Organographie Végétale,' 1832, translated into German and enriched with valuable notes by Meisner and Rœper,) may be found echos of Gœthe's theory, and evidences of a further progress in that direction. It is not possible, however, definitely to assign to each individual his own property in truths which spread with rapidity and force among thinking men. They do not originate from one head, they belong to the *time,* which excites them in many minds and enunciates them in various forms. In this view, nothing seems in more wretched taste than contention about the priority of a theoretical idea. The students of nature freely acknowledge that they derive their ideas from the objects of their examination, not from themselves; they announce them with so much the more confidence in proportion as they recognise in them only the words of nature, which they have become worthy to hear.

The fall of Napoleon restored to our friend his political independence. He had returned to Geneva in the year 1814, to visit his friends. The contemplation of the prosperity which the republic enjoyed on its separation from France, the associations of childhood, the patriotic pulsations of his heart, all drew him back again to his home. The political commotions in the south of France, at that period, were not adapted to render his residence there agreeable. Called during the Hundred days to be Rector of the University of Montpelier, he had to struggle with a host of difficulties, especially as the return of the Bourbons produced a dangerous reaction against those who had served under the Emperor, and especially against Protestant families. Although no partisan, yet DeCandolle was obnoxious in both points of view. His own country presented (under less brilliant auspices to be sure than in Montpelier) the attractions of the father-land, the satisfaction of labouring for his countrymen, repose from political convulsions, and with all these sources of enjoyment, a society such as Geneva alone, situated as it is on the highway of the world, can collect together.

The State Council of Geneva created for him a professorship of

natural history, and he returned, on the 8th of November 1816, into the service of his native country. The French government did not part with him willingly; his scholars at Montpelier made every possible effort to retain their beloved teacher, but in vain. In Geneva he had lectures to deliver in zoology as well as botany. In this field likewise he manifested his happy talent for instruction, and all his lectures were enthusiastically received by a crowd of hearers.

At the instigation of DeCandolle a botanical garden was instituted, of which he was the curator until his death. More than 500 subscribers formed by degrees a fund of 89,000 francs, appropriated to the support of this garden. This is not the only testimony of the sympathy of his fellow-citizens in what DeCandolle recommended as for the interest of science and of the town. There was accidentally entrusted to him for a short time a large and valuable collection of drawings of Mexican plants, made by the Spanish botanists Leon Moçino and Cervantes, in Mexico. These being unexpectedly called for, all the artists and amateurs of the city assembled at his request, and in eight days' active labour made a complete copy of all these drawings. DeCandolle told me with glistening eyes, that this proof of the regard and affection of his fellow-citizens was one of the most delightful experiences of his life. But who among his associates would not gladly have assisted in scientific efforts a man who was distinguished by so much gracefulness, by such transparent frankness, united with such fine tact in social intercourse? He was a keen observer, an accurate judge of the human heart. It was therefore easy for him to associate with all classes in society, and to influence all for the good of the commonwealth. This is manifest by his being chosen in the year 1816 into the Council of the representatives of the canton, and being twice unanimously re-elected after the first time of service, in the years 1829 and 1839, by the voice of the people. As long as he lived in his paternal city, he was called by the confidence of his fellow-citizens to situations of public responsibility. He examined with a penetrating glance the condition of municipal affairs at that time; a friend of order and of a peaceful progress, he set on foot many useful institutions, and applied himself to the carrying out of others which were projected by congenial patriots. He took an active part in the formation and enriching of the museum of the Academy; I have already mentioned that the botanical garden was created by him. As president of the Society of Arts, he animated every movement of his fellow-citizens in the field of arts and manufactures. He considered attention to agriculture of peculiar importance in a small republic which depends upon its neighbourhood for the necessaries of life. On this account he founded in that society a peculiar class for

agriculture, whose labours he promoted with the most lively interest. To impress the agriculturist with the importance of his calling, to awaken in him the spirit of emulation, of observation of nature and of careful reflection, he regarded as one of his most pleasing duties, both as a citizen and as a man of learning.

His imagination was lively and excitable, if not creative; his feeling for beauty was pure and unprejudiced: he could not therefore be other than a warm friend of the fine arts, and he accomplished for their support in his canton whatever lay in his power. Yet he did not carry his love for the fine arts to excess, but always regarded them merely as means for the embellishment of life: not so the attainment of objects of real utility; these lay nearer to his practical understanding, to his spirit of republican citizenship. On this account the Class of Industry in the Société des Arts had reason to rejoice in his peculiar co-operation. The report of 200 pages which DeCandolle prepared in the year 1828, for the Industrial Association of Geneva, is a valuable testimony to his varied knowledge, and his devotion to the manufacturing interests of his country.

The institution of the council of the museum, the improvement of the schools through the extension of special instruction, the enlargement of the public library, the direction of schools for the people, the definitive organization of an institution for the deaf and dumb, his contributions for the erection of a small post for the use of the rural communities, and also for the founding of a better system for the instruction and examination of medical and surgical students—all these actions of an elevated patriotism either originated with him, or received his earnest and effectual support. It must be particularly mentioned in this place, that he exercised the most beneficial influence on all the departments of public instruction by his counsel, by his powerful aid, and by the authority of his name.

It was his constant effort to increase the desire for knowledge,—to extend the circle of science. He was inspired by that genuine aristocracy, which we find also in a Cuvier, a Fourcroy and a Laplace; he wished to raise science to the rank of a princess, that she might make herself the servant of mankind. In this sense also he was a great friend to publicity; he helped to introduce it into his country; he caused it to be prized at a period when it had not yet been regarded with favour, and in which it not seldom called forth suspicion and alarm.

In his place as member of the representative council, subjects of great political importance were often referred to him. He discharged all such commissions with as much skill as independent disinterestedness. More than thirty commissions of this kind were executed by him with as much assiduity as if they concerned ob-

jects of his own favourite science. His friend, the first Syndicus, Rigaud, who honoured his memory by a discourse on occasion of the induction of the lately elected deputies, mentioned two such labours; one relating to a project for a committee for procuring provisions for the city (*comité des subsistances*) of the year 1820, and another two years later, on the project for reprisals against France in relation to their exports and imports, which had for its object the rejection of the project. Mr. Rigaud remarks on this subject, "The first report was an excellent work, which touched on the most important questions of national œconomy. It introduced also just ideas on the question of provision for the people by other means than by the government, at a period when the remembrance of a recent time of scarcity had fixed many prejudices even in the minds of enlightened men. DeCandolle exerted himself to present the doctrines of political œconomy in an intelligible manner, just as he tried to clothe every other species of knowledge in a popular dress. As early as the year 1817 he had published a treatise for the instruction of the public, on occasion of a disturbance among the people arising from the dearness of potatoes. In his report upon the project of introducing restrictions on the trade with France by way of retaliation, he developed the principles of true freedom of trade in his peculiarly lucid manner. His influence in the representative council was great. It was grounded on a high opinion of his character, as well as of his extraordinary talents, and on an eloquence which expressed his inward convictions with the fire of sudden inspiration. As a citizen and member of the council, DeCandolle pursued steadily but one object; that of bringing opinions into harmony,—of always drawing more closely the bonds of unity among the citizens of Geneva. He exerted himself to convince his numerous friends, often of different political parties, that extreme opinions could not find room in a small republic, and that reciprocal sacrifices were often required for the good of the country."

It may perhaps, gentlemen, appear at first sight irrelevant to the present occasion, to enter so much into detail respecting DeCandolle's influence as a citizen and magistrate; yet I find myself called upon to do so on many accounts. In the first place, we thus learn to appreciate the whole power of a mind, which could combine with an almost inconceivable productiveness in its own science so great a power for quite different affairs. We may also obtain additional points of comparison, which may place both aspects of DeCandolle's character in a peculiar light. This warm devotion to his republican country, this self-sacrificing attachment to its interests, is a trait in which he resembles the sages and philosophers of classic antiquity. As Aristotle found time, in the

midst of his numerous works on physics, natural history and philosophy, to write others on politics; as nearly all the Grecian philosophers, in addition to their widely different pursuits, were also practical or theoretical statesmen, so we find the citizen of the small Swiss canton penetrated with ideas and feelings which belong to him only as a citizen of this inconsiderable spot of earth; he, the same man whose writings, composed in either the Latin or French language, are read from the Ganges to the Mississippi. We cannot escape the thought, that so active a devotion to the interests of the community could only exist in the mind of a learned man in whom the ancient associations of republicanism have not given place to the modern spirit,—the spirit of monarchical centralization. This old classical mode of thinking showed itself in many other great Swiss scholars, in Conrad Gessner, Alb. von Haller, Saussure, &c., as well as in DeCandolle, though not in an equal degree; for however attached from inward conviction to the form of government of their country, not one of them had so earnest a desire to take an active part in the internal affairs of the republic. They were all rather theoretical students; while in DeCandolle was reflected the spirit of our age, which passes onward from theory, from pure science, into realization in the form of useful ideas. The thought of the dignity and perfectibility of man, which the French Revolution had so often in its mouth, only to degrade, shone out in the noble-minded, ardent citizen of Geneva,—a son of the Revolution in the highest sense of the word.

A comparison of Linnæus with DeCandolle in this point of view, will result greatly in favour of the latter. We see Linnæus in Upsal, a remote and inconsiderable university-town of the North, active in the professor's chair, where he is surrounded by a crowd of young men eager for knowledge from almost every part of the earth; or we see him at the writing-table of a small room, from which the dictator of natural history sends throughout the world his works, written in that terse, genial Latin in which his whole self is mirrored. There only lives Linnæus; or in *aula academica*, presiding over the discussions of his scholars; or in the small primitive botanical garden, where the registrator of the vegetable kingdom walks between formal rows of box and regular flower-beds in silent meditation. The northern natural historian withdrew himself from the world; he did not even deign to take part in the administration of the academic senate, which he regarded only as a burden. Restricting his society to a few friends, and to the unfrequent visitors from other countries, Linnæus looked not upon the bustle of the world, except sometimes to deprecate it; only in the concrete study of nature does he find himself at ease. He is no cosmopolite, except that he studies na-

ture in every zone; he recommends Swedish medicinal and esculent plants instead of those which distant countries might offer. His mind becomes a denizen of every corner of the earth, but he belongs personally to Sweden alone. He allowed all political commotions to pass by him unheeded while absorbed in the contemplation of nature; chained to his little inkstand, from which he scattered through the world, with luminous, aphoristic geniality, his thoughts, his anticipations of higher wisdom,—almost always expressed in the language of Scripture, and with an emphatic unction.

How entirely different was DeCandolle! He is the man of the council, the man of the people. His power was felt as well in the Genevan republic as in the republic of letters. No movement in the political world is to him a matter of indifference. He notices every change, and marks its relations to the progress of science. If he open his lecture-room, it is not merely active young men who sit attentive at his feet: the *élite* of the fashionable world and of the higher walks are among his auditors; men and women of his own city, and numerous travellers from distant lands, who, between Paris and Rome, crowd the highway of European travel, passing through Geneva, all felicitate themselves upon having listened to his eloquent discourses. Whilst the northern student of nature meditates in solitude by the light of his study-lamp, the pride of the learned world of Geneva, in his saloon, surrounded by the comforts of a half-English, half-French establishment, receives the visits of rich or celebrated friends and of his fellow-citizens, who talk of the movements of the political world, consult with him on the interests of their country, or listen to the voice of some enlightened citizen of the world, with lively interest in his far-reaching plans.

Thus are portrayed, in the persons of Linnæus and of DeCandolle, not merely the state of the natural sciences, but also the more universal features of the spirit of their respective æras, as exhibited in the school and in life.

But in order to complete the portrait of our departed friend, I must now give a more particular account of those literary works which he commenced soon after his return to Geneva, when his mind had attained its full maturity; those works which especially authorize us to term him the Linnæus of our time; I mean his universal system of plants (an undertaking which was the result of the observations of many years of repeated visits to the great collections of plants in Paris and London*, and of a diligent correspondence with all the considerable botanists of the world), which he began to publish in the year 1818, and continued to labour

* In 1816 M. DeCandolle visited Sir J. E. Smith at Norwich, where the Linnæan Collection then was.—Ed.

upon with unexampled diligence until the end of his days. Since the death of Willdenow (in the year 1810) and the publication of the 'Enchiridion Botanicon' of Persoon in 1809, botanical literature comprised no work which presented a universal view of all known plants according to their genera and species. The new edition of the 'Systema Vegetabilium' of Römer and Schultes made but little progress after the death of the former. The systematic knowledge of plants remained in a fluctuating state. Whilst numerous monographs appeared, and the materials were multiplied by discoveries in all the countries of the earth, there was no clue to guide in the labyrinth of countless forms. At the same time, the necessity was constantly more and more felt of arranging plants, not in the dead framework of the Linnæan sexual system, but according to the so-called natural families in a comprehensive scientific whole. If we are not even yet able to conceive of these original types, as so many foci of the moving and forming spirit pervading the vegetable world, expressed in each individual case by more or less striking external characters; if we are obliged in the first instance to adhere to collective characters, that is, to the admission of a certain sum of distinctive marks; if it must further be acknowledged, that although we can perceive the principal characteristics, as they exhibit themselves in a few families, yet that we lose them entirely in their *organic*, that is, in their *universal* connexion—in their evolution, as it were, out of each other; if especially we cannot deny that the natural method does not yet bring with it any philosophic satisfaction; that above all, the inward truth does not harmonize perfectly with *any* system,—it must however be acknowledged, that we can in no other way attain to an understanding of the kingdom of plants as a great whole, than by the path of a thoroughly concrete examination, led by the hand of analogy and induction. The German students of nature acknowledge that such an understanding cannot be obtained by speculation, nor by any constructive method; and they can only promise themselves favourable results by pursuing the path opened by Jussieu's 'Méthode Naturelle.' In other countries also—for example, in France and England, more recently in Italy likewise—Jussieu's doctrines had already struck powerful roots; and thus was the age expecting and prepared for a work which should extend the applications of the "natural system," carrying it on from the *genera* in which its founder had represented it, to the *species*, and giving by means of it a full and satisfactory description of the latter.

In order to have a due conception of the vastness of this undertaking and its enormous difficulties, it is necessary that we should glance at the progress of descriptive botany. This part of the science, which so many regard as a lifeless register, others as

the whole sum of botanical knowledge, dates no further back, in a systematic form, than the sixteenth century. In 1584 Conrad Gessner published the first methodized work upon the vegetable kingdom. In 1623 Caspar Bauhin produced the first systematic register ('Pinax'), in which about seven thousand species of plants were indicated by names and some description, but without characteristics. Tournefort published the first work which can be properly called a systematic arrangement, in the years 1694 and 1700. His work contains 9516 articles, or about 8000 species of plants; and this number was not materially increased in the next succeeding general work, the 'Historia Plantarum' of Ray, in the years 1693 to 1704. In 1737 Linnæus gave his first systematic description of known plants. As Tournefort had introduced the conception of *genera* into science, that of *species* was now established, along with a method of description based on a well-founded and enlarged terminology. But Linnæus, in throwing overboard a vast number of old and unintelligible accounts of plants as useless ballast, at once reduced the list of species to about 7000, a number which in the later editions of his 'Systema' may have been increased to about 12,000. Since that time the increase of acknowledged species has been truly prodigious. In the last of the works of Linnæus, in the year 1760, we find in the first five classes of his sexual system 1835 species of plants; Vitman in 1790 has 3491; Willdenow in 1797, 4831; Persoon in 1806, 6121; Römer and Schultes from 1817 to 1823, 13,519 species. In the first edition of Steudel's 'Nomenclator Botanicus,' the first complete 'Pinax' since Bauhin, the number of genera of Phænogamous plants, or of the first twenty-three classes of the Linnæan system, amounts to 3376, and that of species to 39,684: the second edition of this celebrated work, on the other hand, which was finished in the current year 1841, reckons of Phænogamous plants, 6722 genera and 78,005 species.

DeCandolle's task was therefore six times greater than that of Linnæus, if we only take simple numbers into consideration. But to this must be added the numerous difficulties which arise from the dispersion of materials throughout a literature in which the botanists of all civilized countries take part. Besides, in the time of Linnæus, science had much fewer foci than at present. Learned societies have now been formed in North and South America, in India and Java, for the promotion of the natural sciences, and separate portions of systematic botany are treated in periodical publications, monographies, and greater or smaller works, written, not in Latin exclusively, as was formerly the case, but often in the language of the country. Hence the acquisition of the requisite literary apparatus merely is now within the reach of only very considerable pecuniary means. DeCandolle, with the most

noble disinterestedness, sacrificed in this cause a great portion of his estate.

Equally formidable are the internal obstacles attendant upon the examination of vast collections of plants. The characteristics of the genera according to the natural method are made to rest upon organic peculiarities, which scarcely required a notice in the Linnæan system; such for example as the internal structure of the ovary, the ovule, and the seeds. The use of the microscope, neglected by Linnæus, is now become quite indispensable. The distinguishing marks of species are founded on numerous and often very minute differences, which require a close examination of all the parts. To make out a diagnosis, the description must now be more circumstantial than formerly, when a few words were sufficient to discriminate between related species. Linnæus's 'Systema Plantarum,' in the Reichardt edition of 1779, describes seven species of the genus *Eugenia*, and only thirteen of *Myrtus*. DeCandolle, in the year 1828, has 194 of the former genus and 145 of the latter, of which he forms two divisions. It is obvious to every one that this immense increase of the labour of the systematic describer must weigh heavily upon each separate species. To this must be added, finally, the necessity of regarding each plant no longer merely as a prepared, or, as it were, crystallized production of nature, as was done by Linnæus, but as a living and acting self-developing being; a view which has been elicited by the doctrines of morphology, and which cannot now be wholly excluded from merely descriptive treatises.

DeCandolle began his great work in the year 1818, in an extended form, under the title of 'Regni Vegetabilis Systema Naturale.' Two volumes had already appeared, when he perceived that so immense a field laughed to scorn the limits of human life; he therefore adopted a condensed form, and published seven volumes between the years 1824 and 1838. With an enthusiasm which has perhaps never inspired any other botanist, he devoted the greater part of the day to this gigantic task. Still he was not able to go through the whole extent of the vegetable kingdom in this manner. The work was interrupted by his death in the middle of the eighth volume; and a great portion of the so-called *Monopetalous plants*, as well as the classes of *Monocotyledones* and *Acotyledones*, are yet untouched.

DeCandolle appears peculiarly great in the accurate comprehension of the characters both of genera and species. In the description of distinctive marks, he not unfrequently departs from the terminology of the Linnæan school. Whilst he at times describes a given object with admirable art, conveying the most lively image to the mind, his expressions occasionally fail of this distinctness. No one who can realize the greatness of the task

will be surprised, that amidst such an overwhelming mass of materials, some objects should be described after a less thorough examination and scrutiny. But we never fail to recognise the intelligent, penetrating systematizer, furnished with the happiest talent for combination, even when not altogether fortunate or thorough in his observation of the particular subject. Well has the greatest English botanist said of him—*his head is still better than his eye.*

DeCandolle has given a fuller development of his morphological and systematic views respecting particular families of plants and genera, in a series of treatises which have been regarded as models of monographical labour by all systematic botanists*. It should be particularly mentioned here, that he enriched the geography of plants, elevated by Alex. von Humboldt to the dignity of a peculiar science, with many important facts, and exhibited also the practical aspect of this study. His general views on this subject are laid down in a valuable "Essai Elémentaire de Géographie Botanique," published in the 18th part of the 'Dictionnaire des Sciences Naturelles.'

I pass over many of the minor scientific labours of this unweariedly active man, such as his systematic account of the species of Cabbage, his description of remarkable plants of the Genevan botanical garden, and numerous contributions to the memoirs of various scientific associations, who vied with each other in thus appropriating the activity of this admirable man. More than a hundred diplomas from learned societies in every part of the civilized world testify his scientific eminence and the extension of his literary relations. Since 1808 he has belonged to the Royal Bavarian Academy of Sciences; since 1822 to the Royal Society of London. In the year 1826 he was chosen one of the eight *associés étrangers* of the Royal Academy of Sciences at Paris; and King Louis Philippe has testified his respect for the learned Genevan by bestowing upon him the cross of the Legion of Honour.

These various marks of respect could not dazzle a man, who, in the most animated intercourse with science and with mankind, perceived the endlessness of the subjects of inquiry, and who exaggerated neither the measure of his own limited powers nor the amount of his influence. Like all truly great men, DeCandolle was modest; and the consciousness of his own worth is shown only in the lenity with which he judged others, and in the heartiness with which he applauded their services. His twofold enthusiasm to increase the knowledge and advance the welfare of the human race, reposed on a gentle but uncompromising character.

* Mémoires sur la famille des Legumineuses, Par. 1825, 4to. Collection de Mémoires pour servir à l'Histoire du Règne Végétal. Par. 1828—1838. (10 Mem.)

From temperament he was impetuous, rapid in determination, firm and unfaltering in execution; he had the practical skill to carry his plans into effect in every variety of occupation. A practised physiognomist would detect these characteristics at a glance. DeCandolle was of a sanguine temperament, of middle stature, firm, broad-chested, with proportionably long and muscular arms, quick and elastic in his walk, light and brisk in all his movements. His oval face, shaded by thick black hair, and by its somewhat dark complexion reminding one of his Provençal origin, was not so much distinguished by the expression of a well-marked and prominent profile, as by the high and finely arched brow, the mobility of the features, the fire of his brown, proportionably small eyes, which shone even through spectacles, and by the charm of his mouth. In speaking, the whole intellectual expression of the man was suddenly elevated. His ideas unfolded themselves easily and without effort in discourse, which, like his writings, inclined rather to rhetorical breadth than to exact conciseness.

The poetical element of his mind, which he manifested while yet a scholar in the college, remained active in him in later years. His fancy, both strong and rich, variously coloured, blooming, and rapid in its movements, clothed his quick-rising conceptions in a light and graceful dress. He has left behind a great number of poems of a lyrical character, in which he represents the universal feelings of nature, or unfolds with grace and delicacy the emotions of the human heart. What we have seen of these reminds us of Lafontaine, Delille, and of our own Pfeffel. From 1821 to his death, he continued his autobiography with great particularity, in which are contained valuable materials for moral and literary history, often under the form of explanatory notes. His son will publish, with such omissions as circumstances require, this memorial of the untiring activity of this excellent man.

But while such variously directed labour found in itself the best intellectual reward, DeCandolle was by degrees obliged to acknowledge the insufficiency of his physical powers for the task he had himself allotted to them. In the year 1825 he had the misfortune to lose his youngest son, a promising boy of thirteen years old. The philosopher sought to soften the sorrows of his heart by increased activity, and redoubled his zeal for the completion of his work; but from that time his health began to fail. He often suffered from attacks of gout, and from obstinate catarrhal affections, and was obliged on that account to relinquish his professorship in 1834, which was transferred by the Senate to his son Alphonse. In the year 1835 he suffered from a severe illness. He was afflicted with an asthma and a disease of the throat [bronchocele?], for which excessive doses of iodine were prescribed. In consequence of this he suffered from *œdema pedum* and from nervous

attacks, which increased until his death. He was never perfectly well after 1835, and his strength was so much exhausted that the progress of the dropsy, which from the month of June rapidly increased, could no longer be opposed with effect. He died at six o'clock in the evening of the 9th of September [1841], having lost his consciousness several hours earlier.

By his will of the 20th of February of the present year [1841] he left his library and his collection of plants to his son, with the condition that they should be open, as before, to the inspection of botanists, as if in a public establishment, and that students should have the use of them until the end of their term of study. The filial devotion of the son has made the fulfilment of these conditions a sacred duty. Many distinguished botanists have promised their aid for the completion of a work which transcends the powers of any individual. DeCandolle bequeathed to the Society of Natural History of Geneva the sum of 2400 francs, the interest of which is to be distributed in prizes for botanical monographs. The right of publishing new editions of his 'Théorie Elémentaire' and of his 'Organographie,' he left to his friend and scholar Guillemin* in Paris; the same right with regard to the 'Flore Française' and the 'Essai sur les Propriétés Médicales des Plantes,' he bequeathed to Prof. Dunal in Montpelier.

This is the image, in its essential features, of one of the most excellent men which the century has presented to receive the honours of science. In botany, that CANDOLLEA, the Australian shrub to which Labillardière has affixed his name, is not required to keep him fresh in the memory of his botanical associates: he has inscribed his own name on every page of the system of plants. Neither does posterity require the monument which his native city proposes to erect to his memory, nor the new "*Rue DeCandolle*" next to the botanical garden in Rochelle, in order to say how great has been the influence of DeCandolle in our time. *Exegit monumentum ære perennius.*

II.—*Observations on some Points in the Anatomy and Physiology of the Freshwater Algæ.* By ARTHUR HILL HASSALL, Esq.

[With a Plate.]

On Cytoblasts in the Algæ.—From the high development of the cells of many Algæ, both marine and freshwater, as well as from their extreme transparency in many species, it might have been supposed that the first discovery of those curious organs termed

* [This favourite pupil did not live even to commence the undertaking thus committed to his charge: he died early in the spring of 1842.—A. G.]

cytoblasts, which exercise an influence so mysterious on the development of cells, and whose presence in cellular structure is so constant as to lead to the suspicion that the association of the two organisms is universal, would have been made in this extensive tribe of Nature's exhaustless works; so far however from this being the case, they have not as yet, from what I can learn, been noticed in any species of Alga; a description of them therefore, as they occur in two genera of freshwater Confervæ, *Zygnema* and *Vesiculifera,* cannot fail to be of interest.

In the first of these genera, *Zygnema,* their structure is exceedingly complicated. Each cytoblast is solitary, and usually occupies a central situation in each cell of a *Zygnema.* It consists generally of two membranes, but sometimes there are three; the innermost of these being either circular or elliptical (the form varying with the species itself as well as its condition) and presenting a nucleated appearance, and all are separated from each other by distinct intervals which are filled with fluid. The surface of the inclosed membrane or membranes is smooth, while that of the external is rendered irregular by the giving off of numerous tubular prolongations or radii which terminate in the spiral threads formed by mucous endochrome and large bright granules, which I regard as the unfertilized zoospores (Pl. I. fig. 1).

Wishing to have a corroboration of my views respecting the structure of the cytoblastic organ described above, and also to learn as much respecting its anatomy as possible, I forwarded a specimen of *Zygnema nitidum* to that able and most obliging observer J. S. Bowerbank, Esq., whose opinion of its structure exactly coincides with my own, that gentleman having in particular satisfied himself of the tubular nature of the prolongations sent off by the external membrane, and of their termination in the spiral threads.

The structure of this curious organ explains with apparent satisfaction one of the offices which it is destined to discharge, viz. that of a laboratory or *stomach,* in which the materials necessary for the growth and vitality of the cell and its contents are received and digested, and from which they are conveyed by means of the tubular radii to those organs by which the materials are to be assimilated.

The cytoblast, therefore, is at first fixed in the centre of the cell by the prolongations which proceed from it; but it happens, that at a certain epoch these radii disappear, and then the cytoblast floats freely within the cavity of the cell; the disappearance of the rays, the cessation of the growth of the cells, and the assumption of the characters of reproduction being almost contemporaneous, or, at any rate, events immediately consecutive on each other, and

the two latter being readily accounted for by the disappearance of the radii (Pl. I. fig. 2 and 3).

The circumstance of the increased development of the cytoblastic body, subsequent to the removal of the radii, gives weight to the opinion that this organ has yet another office to perform in addition to that of presiding over the growth of the cells; for were it not so, it might be expected that on the disappearance of the rays it would shrivel up and at length become absorbed, as is the case with other organs, their allotted duties having been performed; and the office which I would attribute to it is one even of more importance than that previously remarked upon, it being no other than the fertilization of the brilliant granules entering into the formation of the spiral threads, and which I regard, as before noticed, as the unfertilized zoospores.

But it may be asked, if this be so, what is the purpose of the union of the filaments of the *Conjugatæ* and intermingling of the contents of two cells, phænomena which present themselves so frequently amongst the Confervæ? This question is not unanswerable; but whether the answer now to be given shall be deemed satisfactory, must depend upon future observation.

It may be that the combination of the material of two cells is necessary in the cases where true spores are to be found, although it would appear that no such combination is requisite in those Confervæ whose sole mode of reproduction, as in the greater proportion of the branched species, is by means of zoospores, fertilization in these being effected by means of the organ described in this paper.

But I must confess, that from circumstances which have recently come to my knowledge, and which I hope to be enabled to make the subject of a detached communication ere long, my faith in the existence of a double mode of reproduction, viz. by true spores and by zoospores in some Confervæ, has been considerably shaken, and my present belief is, that the only method which exists is that by zoospores; in which case the commingling of the contents of two cells, and the formation of large spherical or elliptical bodies furnished with membranes by such commingling and union, might be thus explained. The combination might be regarded merely in the light of an act of œconomy on the part of nature, whereby a saving of organization is effected, and the bodies themselves as so many sporangia filled with zoospores.

The adoption of the view which supposes the fertilization of the reproductive bodies by means of the organ whose complicated anatomy has been dwelt upon, would have the effect of removing some grand difficulties in the way of the complete understanding of these most interesting productions. Thus, first, by furnishing a definite organ whereby fertilization is occasioned, it removes

the inability which has hitherto been felt to explain in what way the intermingling of bodies in all respects so similar in organization and appearance as the bright granules of the Confervæ seem to be, can be regarded as giving origin to fertility; secondly, it does away with the anomaly, which has always appeared to me so strange, that a combination of the matter of two cells should invariably take place in certain divisions of the Confervoid tribe of productions, while in other divisions of the same tribe, which could not be supposed to differ fundamentally from the former, no such phænomenon has hitherto been recognised, by showing that this combination is not an essential to the perpetuation of the species; and thirdly, it explains the permanence of species which have perished before union of the endochrome and formation of spores have taken place.

I do not wish to assert that the above opinions rest in their entirety upon conclusive facts, but would merely remark that they are opposed to no known established fact in the history of the Confervæ, and that instead of adding to the difficulties which envelope some points in the physiology of these productions, they have the advantage of removing several obscurities. Their true value must however be developed by extended observation*.

I have detected cytoblasts in numerous *Zygnemata*, but the best species in which to examine them are the larger kinds, such as *Zygnema maximum*, *Z. nitidum* and *Z. belle*. Of the genus *Vesiculifera* I have also found it in several species: they cannot always be seen in these, owing to the cells not being transparent; I doubt not however but that they are general in it as well as in other genera of Algæ, whether marine or freshwater. For its appearance in this genus, see Pl. I. fig. 6.

In conclusion it may not be out of place here to observe, that Mr. Bowerbank was enabled to detect in the *Zygnema* which I transmitted to him, *Z. nitidum*, two other minute organs, both of which I have since myself more than once observed; the one

* Since the above passage was written I have several times encountered a *Zygnema*, in which all the spores are formed without either union of the filaments or commingling of the contents of two cells; that is, they are formed separately in each cell. This observation, the accuracy of which does not admit of the slightest doubt, is therefore, in a high degree, corroborative of the opinion that the central organ in each cell of *Zygnema* and other Confervæ is that by which fertilization of the zoospores is effected. To this species I have given the name of *Z. mirabilis*. In a species of the genus *Mougeotia*, *M. notabilis*, spores are also formed in each cell. Another fact may be here alluded to, which confirms in a manner no less strong this opinion, which is, that although the filaments of *Mougeotia genuflexa*, *M. compressa* and their allies conjugate even without the intervention of transverse tubes, yet *no transference of endochrome ever takes place and no formation of sporangia occurs.* This curious particular is the result of continued observation for two successive years.

is cruciform and adherent to the interior wall of the cell. It, Mr. Bowerbank remarks, is probably the vegetable structure which secretes the raphides. The other body is small, elongated, somewhat curved, and attached to or lying upon the plant. This, Mr. Bowerbank observes, is certainly a "string of minute cytoblasts; and similar bodies, but more curved, are observed in the soft parts of the young lips of shells, both land and freshwater." More than one of each of these organs may be found in each cell. For representions of these see fig. 1.

The Rev. M. J. Berkeley has kindly favoured me with an abstract of a paper by Hugo Mohl on the genus *Anthoceros*, published in 1839 and inserted in 'Linnæa,' vol. xiii. p. 273, in the cells of which an organ occurs bearing a considerable external resemblance to the radiated structure met with in the cells of *Zygnema*.

The following is a brief outline of the mode of formation of this structure in the genus *Anthoceros*. When an immature cell of one of the species of this genus is examined, a portion of its interior is seen to be occupied by a layer of green granules, through which may be seen a cytoblast, the other portion of the cell being colourless. Treated with iodine, the layer formed by green granules, as also the colourless part of the cell, becomes yellow, showing that the whole is really lined with a sort of quasi membrane. Gradually the green layer becomes concentrated into two masses, which commence to advance more and more towards the middle of the cells, and the edges of these masses spreading in various degrees over the inner wall of the cell, leave intervals of various sizes, which give to them a cellular appearance. "The nucleus or cytoblast," Mohl observes, "has no part in this formation. Frequently it is so concealed beneath the green granular mass that it cannot be seen without some trouble; sometimes it lies near to or between both divisions of the green mass and then more easily comes into sight, but at the same time it is observable that it remains unaltered and is foreign to the whole of the slimy structure described above. The latter seems only so far to have a relation to it, that its point of concentration is always at the place where the nucleus lies, and indeed between it and the walls of the mother cell."

Subsequently, the two masses become divided into four, and the reticulated appearance produced by the spreading of the masses subsides into radii, which are similar in aspect to those emanating from the cytoblast in the *Zygnemata*, each arising separately from the masses and terminating on the inner surface of the cell. Finally, each radiated mass becomes a perfect spore or cell, separated from each other by distinct cellular walls, in which changes similar to those just described take place for the production of

other spores. The great similarity in the structure of the incipient spores in the genus *Anthoceros* with that of the radiated organs in *Zygnema,* would lead to the supposition that they were identical in their nature; so far however from this being the case, I consider that all analogy between them terminates with the outward resemblance. The difficulties in the way of regarding the structure in *Zygnema* as an incipient germ or spore appear to me to be insuperable; for the question would immediately arise, wherefore is it, that since the contents of *two* cells generally go to form a single spore in the genus *Zygnema,* and since this radiated organ is present in *every* cell, that the one is suppressed, while the other is destined to give birth to the future *Zygnema*? Supposing however a satisfactory solution of this difficulty to have been made, still another arises. It is far from being an incontrovertibly established fact, that the elliptical body formed in *Zygnema* by the concentration of the matter of two cells, and usually denominated a spore, does really contain but a single germ. It is far more consistent with known facts to suppose that they are sporangia filled with fertilized sporules; for this is certain, that numerous zoospores are formed within each cell, and which may even be seen through the membrane of the sporangia themselves by the aid of a good glass, these zoospores being also identical with the brilliant granules of the Algæ.

The highly interesting observations of Mohl on the genus *Anthoceros,* the accuracy of which is in no respect questioned by me, do not therefore occasion any modification of the views expressed of the functions of the radiated organ in *Zygnema.*

On Tubular or Vascular Structure in the Freshwater Algæ.— In the genera *Vesiculifera, Zygnema, Microspora,* and doubtless in many other Algæ, the zoospores up to a certain period of the development are connected with each other, and probably with the central cytoblast, by means of a tubular or vascular network, in the angles formed by which the zoospores are situated. This structure is most manifest in *Conferva crispata* and its allies (see fig. 8), and requires, in order that it may be clearly seen, that the development of the species should be considerably advanced and the zoospores somewhat scattered. It may, generally, however be easily detected in the genera *Vesiculifera* and *Zygnema*: in the latter the tubular formation is not arranged in a reticulated manner, but occupies the centre of each spiral thread (Pl. I. fig. 1, 2, 3). It is by the inosculation of the tubular radii given off by the central cytoblast with this vascular structure that a direct communication is established between that organ and the zoospores: now presuming that the cytoblast in the other Algæ in which it occurs presents at some period of its existence a similar formation to that which it exhibits in the genus *Zygnema,* and adopting the

view before expressed of its office in presiding over the development of the cells, it is clear that this tubular apparatus is designed to facilitate the transmission from zoospore to zoospore of the elaborated nutriment transmitted by the cytoblast. The organic mucus and endochrome, from their appearance and limitation in the genus *Zygnema,* may be supposed to have passed by exudation from the interior of the tubes to their surfaces. See fig. 1, 2. 3.

On the Formation of Spores (*Sporangia?*) *and their investing Membranes.*—The following would appear to be some of the steps in the formation of spores. The material, whether consisting of the contents of one or two cells, out of which each spore is to be formed, first consolidates itself in the centre of those cells in which it is to be elaborated; the zoospores, which continue to increase in size, retire from the surface of the mass so as to leave only organic mucus surrounding them; this then assumes the form of spore peculiar to the species, its surface, lastly, becoming hardened into a compact membrane or membranes.

Observations on the genus Zygnema.

The species of the genus *Zygnema* readily resolve themselves into two divisions or subgenera, which are to be distinguished from each other by the conformation of the cells.

In the first of these subdivisions, which for the most part includes the long-celled species of the genus, such as *Zygnema elongatum* and *Z. quadratum,* &c., the opposed extremities of *all those cells which have attained maturity* are considerably inverted, and which inversion may be compared to that of the finger of a glove (Pl. I. fig. 4); while in the second, which embraces the short-celled examples, as *Zygnema maximum, Z. nitidum* and very many others, the cells are not inverted, but touch each other by their plane surfaces.

The form of this inversion is, in all the species in which it occurs, identical and extremely regular, its circumference being circular and its base somewhat flat; no membrane intervenes between the spores formed by this indoubling in contiguous cells, which spaces therefore communicate directly with each other.

At the period of reproduction, and at no other, one of the two indented and opposed extremities of certain cells becomes everted and protruded into the cavity of the other (Pl. I. fig. 5).

The cause of this protrusion, and the reason why it only occurs at the precise period of the reproduction of the cells, are easily accounted for, and both arise from unequal internal pressure of the contiguous cells on each other, which inequality of pressure is produced by the emission of the endochrome of one cell into a neighbouring cell either in the same or different filaments; thus,

when a cell has discharged its contents its cavity is empty, and no resistance can be offered by it to the protrusion of the inverted portion of the adjacent cell or cells, replete as it or they are with fluid and endochrome. This explanation applies likewise to the fact, that when a number of cells have either emptied themselves of their contents or have been the recipients of those of other cells *at the same time* no eversion takes place, for in this case there is no inequality of internal pressure.

But while a correct exposition may be given of the cause of this protrusion and intromission, it is not so easy to offer a satisfactory explanation of the purpose to be attained. The eversion doubtless assists in effecting the dislocation of the cells, and thus, reproduction being perfected, hastening the destruction and dispersion of the species; processes, which, from the greater length of the cells and consequent continuity of the enveloping sheath, would possibly occupy, were it not for some special provision of the nature indicated, a much longer time than in the short-celled species. A subordinate and not unimportant use of this provision is, the assistance which it affords in the determination of allied species.

It is remarkable that no similar conformation presents itself to our notice in the genera *Tyndaridea* and *Mougeotia,* so closely allied to *Zygnema,* for in these the cells terminate by plane surfaces, which however may be either everted or inverted to a slight extent.

This peculiar formation of the cells of some *Zygnemata* was first noticed by me in the spring of 1842, but its true nature only became apparent to me in the early portion of the present year. When viewed through a low power of the microscope, and in a *Zygnema* whose filaments are as yet separate, it exhibits the appearance of two curved knife-blades slightly approximating to each other at their apices, near to which usually lies the divided spiral thread, and strongly impressing the superficial observer, from the position and aspect of these blades, with the idea that they are the instruments which effect its separation, and reminding him of the beautiful provision whereby the section of pollen granules is brought about.

On transmitting a short time since a specimen of the *Zygnema* now figured (*quadratum*), in a state of reproduction, to the Rev. M. J. Berkeley and Mr. Ralfs, but unaccompanied by any remarks in reference to the structure of the cells, both these gentlemen noticed their peculiar conformation, and from the former I received correct sketches of their appearances.

The structure of the joints in *Zygnema* was long since noticed in one species of the genus by Mohl, who thus describes it in his paper upon the multiplication of cells by division inserted in the

'Flora':—"In *Z. elongatum*, Ag., the dissepiments have a very peculiar structure, which I have found in no other species. The terminal surface of each cell is not even, but elongated into a blunt conical process. This process can only be observed in its true state when two joints are separated one from the other; when, on the contrary, the threads are unbroken the process is generally introverted like the finger of a glove, and exhibits the form represented at Pl. I. fig. 8. *a, b, c*. This is the common condition, and in most threads no joint is found otherwise constructed. But I have now met with a single thread in which a part of the articulations have the ordinary length, while another part has joints only half as long. In these shorter articulations it was normal that only the alternate dissepiments had the structure peculiar to this species (so that by these dissepiments the thread was divided into articulations of the ordinary length), while, on the contrary, the intermediate dissepiments exhibited the form usual in Confervæ*."

The observation, that "this process can only be observed in its true state (that is, everted) when two joints are separated the one from the other," is inaccurate, for the cells may be separated and yet the processes inverted, the eversion of them having nothing whatever to do with the separation of the cells, and never being in any case the result of it, but depending, as explained already, upon unequal internal pressure, and occurring chiefly at the period of reproduction. The effect of the eversion is, as already observed, to occasion the dislocation of the cells.

Again, in every filament of those *Zygnemata* which exhibit the inverted structure, cells may be observed terminating in the ordinary manner of Confervæ, viz. by plane surfaces, the presence or absence of the inversion depending upon the period of the formation of the dissepiments; the older ones, or, as observed in the beginning of this notice, the more mature ones only presenting it. Thus it follows that the *opposed extremities* of cells always exhibit the *same* structure, and that this alternation in form supplies evidence the most conclusive of the multiplication of cells throughout the *entire filament* of a Conferva by division.

Observations on the genus Vesiculifera.

The genus of freshwater Confervæ which I have denominated in a previous article *Vesiculifera*, in addition to the characters indicated in the definition of it given therein, such as the attachment, attenuation and slight mucosity of the filaments of the species composing it, as well as the formation of true spores by the intermingling and union of the contents of two cells in the same

* Flora, 1837, vol. i. p. 29.

filament, is particularly distinguished by the presence of a peculiar and regular annulation of the enveloping membrane of the cells, which would appear at a certain epoch to be intimately adherent to the tissue of the cells themselves (Pl. I. fig. 6).

This annular disposition of the sheath of the cells does not occupy its whole extent, but corresponds only to certain cells and determinate portions of those cells; the cells around which it is disposed being those in which the spores are destined to be formed, and the portion of these which it invests being the extremities through which no endochrome passes from the contiguous cells for the formation of the true spores, or rather perhaps sporangia.

The number of annuli which correspond to each fructiferous cell varies considerably according to the species, and is more considerable in the long-celled species; it would appear however to be never less than two, or more than eight or ten.

The use of this interesting structure is much more apparent than that of the provision already noticed as belonging to one section of the genus *Zygnema,* and admits of a most satisfactory explanation, it being manifestly designed to afford an outlet to the imprisoned spores, which it may be supposed to do in the following way. As soon as the species has reached its maturity and the spores have become perfected, the annuli, which are intimately united to the cells, contract, most probably from the arrest of growth and diminution of vitality of the plant which occur towards the completion of the process of reproduction, drawing along with them, and thus rupturing, the slightly elastic membrane of the cells (Pl. I. fig. 7).

Without some such beautiful and effectual provision, it will be evident, on reflection, that the spores would have to remain immured within their narrow cells for an indefinite length of time, even until, perhaps, their vitality had ceased and the cells had become their coffins; for occupying, as the spores do, but a portion of the space of the cells, and enveloped as they are in membranes, they can themselves, of course, exert no influence in producing the rupture of the walls of those cells.

In all the Confervæ with which I am acquainted, some special means are provided for the escape of the spores or zoospores, their liberation never being left to the sole agency of decomposition of the tissue of these plants; thus, in the majority of the branched Confervæ, and in the species of the genus *Sphæroplea* as well as in many other Confervæ, their liberation is effected by the rupture of the cells in which they are contained, which rupture is occasioned by the development of the zoospores while still inclosed within the cells; in *Conferva* (*Microspora*) *glomerata* a special aperture exists for the escape of the zoospores at the period of re-

production, situated at one side of the distal extremity of each cell; in the Conjugating tribe the zoospores pass out through the openings of the connecting tubes of the cells, which, when reproduction has been completed, separate from each other; and lastly, in the *Vesiculiferæ*, as has been shown, a more complicated provision exists for the egress of the spores and zoospores.

Of all characters whereby the *Vesiculiferæ* may be distinguished from other Confervæ, that derived from the conjugation of the investing sheath is perhaps the most valuable, from the circumstance not merely of its being confined to the species of that genus, but from its constant presence in all stages of their development; and not only is it interesting as being indicative of a *Vesiculifera*, but also as pointing out those cells, even in the young and but little developed *Vesiculifera*, which are destined to carry the true spores when the species shall have arrived at the perfection of its life.

Meyen, by whom this interesting structure seems first to have been noticed, gives the following account of its characters in a species which he calls *Conferva rivularis* :—

"The annular structure appears worthy of notice, which the upper end of many of the joints of the Conferva represented exhibits. This appearance is altogether analogous to the annular structure observed in the horny coat of the *Campanulariæ*. In those polypi also this structure appears first at an advanced period of growth, as is the case with the Conferva, and indeed in very different species of articulated plants of this family. The formation commences with a thickening of the membrane; the constrictions then appear, which are not spiral, but run in horizontal rings one above the other. Sometimes it seems as if this ringed substance were an entirely new formation."—Meyen, 'Pflanzenphysiologie,' vol. iii. p. 451.

The above is the entire of Meyen's account of this corrugated formation, which does not in all respects accord with my own observations. The structure is, amongst freshwater Algæ, confined to the species of the genus *Vesiculifera*.

The purpose to which the annular disposition of the horny coat, of not merely the *Campanulariæ* but of most hydroid Zoophytes, is subservient, is probably that of rendering their polypidoms more flexible, and consequently less liable to injury from the agitation of the restless element in which they dwell.

I have, in conclusion, to record my thanks to the Rev. M. J. Berkeley for the friendly interest which that gentleman has taken in the above observations, as well as for the valuable references and extracts from the 'Flora,' &c. incorporated with these remarks.

Cheshunt, May 14, 1843.

EXPLANATION OF PLATE I.

Fig. 1. A magnified cell of *Zygnema nitidum*; exhibiting the structure of the central cytoblast prior to the cessation of the growth of the species, the tubular connexion between the zoospores, and other points in the anatomy of the *Zygnemata.*

Fig. 2 & 3. give the appearances of the cytoblast subsequent to that epoch, and to the removal of the radii.

Fig. 4 & 5. show the structure of the joints in *Zygnema quadratum*; a similar formation existing in a considerable number of *Zygnemata.*

Fig. 6. represents a filament of *Vesiculifera capillaris* prior to the assumption of the characters of reproduction.

Fig. 7. The species in its perfect condition.

Fig. 8. The vascular connexion between the zoospores taken from *Conf. crispata.*

III.—*The Birds of Ireland.* By Wm. Thompson, Esq., Pres. Nat. Hist. Society, Belfast.

[Continued from vol. xi. p. 290.]

The Red Grouse—*Tetrao Scoticus*, Lath.—is common to heathy tracts of every altitude, from the low bog, which is barely elevated above the sea, to the summits of the mountains throughout Ireland, and the adjacent islets. In the most favoured localities the species is as plentiful as in the Highlands of Scotland; but our moors, instead of being let as in that country to the highest bidder, are, with rare exceptions, reserved by the proprietors for their own, or their friends' shooting*.

On the range of the Belfast mountains, rising to nearly 1600 feet in altitude, the grouse still maintains its ground, and in the evenings of summer and autumn, when taking a favourite walk to the mountain-ridge to behold the grand and varied prospect on every side, and above all, to watch the down-going of the sun behind the distant mountains on the farther side of Lough Neagh, and see the vast expanse of waters steeped in the most lovely hues, the crowing of the grouse has almost invariably enlivened my walk home. To my ear the call is delightful, from its association with the wildness of nature. When undisturbed at such times, the alarm note well known to sportsmen as a repetition of "the syllable *kok*" was rarely heard, but the crowing—which is admirably represented by the words "*go, go, go, go, go-back, go-back*†"—is

* It has been remarked to me that the grouse of Ireland and Scotland differ in size and colour; but this, though apparently correct when birds of a certain district are compared with those of another, I consider to be a partial view, for in different localities throughout either Scotland or Ireland birds will be found equally to vary in these respects.

† Macgillivray's 'Brit. Birds,' vol. i. p. 181, where it is added that "the Celts naturally imagining the moor-cock to speak Gaelic, interpret it as signifying *co, co, co, co, mo-chlaidh, mo-chlaidh*—that is, *who, who* (goes there?) my sword, my sword!"

continued for a long time, commencing in the month of September about half an hour after sunset. From about the same spot I have heard this call on many evenings, thus indicating the partiality of these birds to a favourite roosting-place. During one of these walks in the month of June, a pointer-dog was inconsiderately allowed to follow me, and by his trespassing on the breeding haunts of the grouse, lapwing, and snipe, caused a continued uproar from the three species, akin to that produced by birds on the sea-shore.

The grouse breeds very early. On the 17th of March a sporting friend once found a nest on the Belfast mountains, containing eleven eggs. When hare-hunting here so late as the middle of April, I have more than once, to my great regret, seen the pack of hounds come upon the nest, and set to work so quickly, that every egg was devoured before they could possibly be whipped off. Fortunately, this bird breeds a second time, if the first nest be destroyed.

For the fact that grouse is a good bird for the table, we have no less an authority than that of the illustrious John Locke! In the life of this philosopher by his descendant, Lord King, are directions, &c. from Locke, apparently addressed to some foreigner about to visit England, one sentence of which is—"Railes and *heath-polts*, ruffs and reeves, are excellent meat wherever they can be met with." —*Page* 134.

The grouse is occasionally subject to variety in colour. One shot in November 1826 by the Rev. Lord Edward Chichester, near Doagh, in the county of Antrim, was pure white, with the exception of the two outer primaries, and an equal number of the feathers of the greater wing-coverts, which remained unchanged. It was a large and healthy-looking bird.

My friend John Sinclaire, Esq. of Belfast, who has been a regular grouse-shooter for upwards of sixty years, states that about Ballantrae, in Ayrshire, he has found grouse in stubble and in grass fields a mile distant from the mountain heath, and has sprung them from the heath in plantations of young trees about fifteen feet in height. He considers that the scarcity of grouse in many places is owing to the increase of sheep pasturing. The nests of this bird are trodden on by the sheep, and the burning of the heath on their account, even if practised at a proper season, deprives the grouse of shelter for some years, and not very unfrequently, by being carried into execution in the early spring, destroys their eggs. Where horned cattle are pastured, he considers grouse to be as numerous as ever. The black grouse, by nestling in marshy places, is not subjected to the casualties just noticed, and hence one reason of the decrease of the former, and increase of the latter, in some districts.

On looking to the food contained in grouse when their favourite berries were not to be had, I have found it to be chiefly the tops of heath, with occasionally the stem of the bilberry (*Vaccinium Myrtillus*). On opening the intestines of a diseased grouse, shot on the 14th of August at Ballantrae, (but which had been wounded perhaps three weeks before,) I found them nearly full of tape-worms (*Tæniæ*). Its gizzard was entirely filled with the fruit of the *Empe-*

trum nigrum, there called heather-berry. My friend just alluded to has frequently found oats in the crops of grouse killed in the last-named locality.

The Capercailzie or Wood Grouse—*Tetrao Urogallus,* Linn.—has unfortunately long been extinct in this country. Giraldus, in his 'Topographia Hibernica,' states, that this species (called by him *Pavo sylvestris*) was more common in Ireland than the red grouse, about the twelfth century. When the island was covered with native woods one can imagine that it may have been so, but even if less abundant, the nature of its haunts might cause it to be more frequently met with than the red grouse, and consequently its being considered more common. The Irish statutes 11 Anne, ch. 7, recite, "that the species of cocks of the wood* (a fowl peculiar to this kingdom) is in danger of being lost," and prohibits the shooting of them "for seven years." Smith, in his 'History of Cork' (1749) observes, that "it is now found rarely in Ireland, since our woods have been destroyed." Rutty, in his 'Natural History of Dublin' (1772), mentions that "one was seen in the county of Leitrim about the year 1710, but they have entirely disappeared of late, by reason of the destruction of our woods."—*Vol.* i. *p.* 302. Pennant, in his 'British Zoology' (1776), states that "about the year 1760 a few were to be found about Thomastown, county of Tipperary." The 27th Geo. III. "prohibits killing moor game, heath game, grouse, pheasant, partridge, quail, land rail, and *wild turkey,* between the 10th of January and 1st of September†." Whether by wild turkey the wood grouse is meant, may perhaps be considered uncertain. There is no uncertainty, however, in the following instance. From the Rev. Mr. Dubourdien's 'Survey of the County of Antrim,' published in 1812, we learn that "wild turkeys are now nearly extinct, though once in such numbers at the former place [Portmore]; the breed, *the true copper colour, with red legs*"!

Black Grouse, *Tetrao Tetrix,* Linn.—For a long period this fine bird has certainly not been a native of Ireland; and that it ever was so is at least doubtful. I have not met with any satisfactory evidence of its being indigenous. Smith, in his 'History of Waterford' (1745), remarks—"It is uncertain if we have not the *Urogallus minor,* Raii, viz. the heath-cock or grouse of Willoughby, which I take to be the black game of England, and is also an inhabitant of the mountains."—*Page* 336. The same author in his 'History of Cork' says of "The black grouse (*Tetrao seu Urogallus minor*):—This species is frequent, and needs no particular description. It

* Willoughby (1678) observes, "This bird is found on high mountains beyond seas, and as we are told in Ireland (where they call it Cock of the Wood), but nowhere in England."

He concludes his description thus: "The flesh of this bird is of a delicate taste and wholesom nourishment, so that being so stately a bird, and withal so rare, it seems to be born only for princes and great mens tables."!

† For these extracts from the Irish Statutes I am indebted to Francis Whitla, Esq.

inhabits mountains, and is rarely seen in lower heath grounds. The cock is almost black, but the female is coloured like a woodcock or partridge." Were this description taken from native birds it would be decisive as to the species, but it may quite as probably have been copied from some descriptive work*. Mr. Templeton states, that he had heard from excellent authority, that "black game is mentioned in some of the old leases of the county of Down," but proof that the *Tetrao Tetrix* was the bird so alluded to, and did exist there, is still wanting. Pennant, in his 'British Zoology' (1776), remarks, that "some have been shot in Ireland, in the county of Sligo, where the breed was formerly introduced out of Scotland, but I believe that at present the species is extirpated."

That when Ireland abounded in natural wood, many portions of the island may have been well-suited to the abode of the black grouse, does not I conceive admit of any doubt; but, again, we know not whether Great Britain may not geographically have been, within its latitude, the extreme western range of the species. I have not seen any record of its being met with west of Great Britain, in any latitude†. Since the period mentioned by Pennant, this species has been introduced into different parts of Ireland, and being turned out, lived occasionally for some years, but I am not aware of its having bred in any instance. There are in the county of Antrim, just opposite to the favoured haunts of this bird in Scotland, localities which seem in every natural feature well-suited to the black grouse. To two of these places, "Claggan," the property of Viscount O'Neil; and Glenarm deer-park, belonging to Edmund McDonnell, Esq., this bird has been introduced with the following success. I leave the respective game-keepers, both very intelligent men, and the best "authorities" on the subject, to speak for themselves. C. Redmond, gamekeeper at Claggan, informed me by letter dated January 1, 1841, as follows:—

"Twelve years ago (two years previous to my coming here) there were four brace of black game turned out, a cock and hen of which I frequently met with outside the plantations in the heath, my pointer dogs setting them like grouse. They were never to be seen together, but kept a mile separate, and each of them always about the same place: the hen I found dead three years ago, and supposed her to have been shot at by a party which Lord O'Neil had here at that time. The cock has left us or been killed also. I saw a cock that was shot last year at Glenariff near Cushendall, [some miles distant] which may have been the same. I was at the letting out of nine black game in 1832 in this place, and a single

* Since this was written, I have had the opportunity of consulting Willoughby's 'Ornithology,' and find that Smith borrows his description of the birds and their haunts from that work.

† The proximity of Ireland to Great Britain may be considered an objection to this view by those who have not looked to the distribution of the *Vertebrata* of the two islands. In the introduction to the Report on the Fauna of Ireland, (published in the 'Reports of the British Association for the Advancement of Science' for 1840,) remarks upon this subject will be found.

bird of them I never saw afterwards; the reason I cannot assign, it might be that they were hurt in coming from Scotland and died, or wandered away, which I believe they are prone to do."

John Inglis, gamekeeper at Glenarm Park, replied to some queries on this subject in the following words in January 1841.

"In reply to your note regarding black game, I am sorry I cannot give you a very flattering account of them. There has been one black cock here about four years. I have not seen him for the last four or five weeks, but I suppose him to be still alive. I think it is likely he came from Claggan, as I believe Lord O'Neil turned out some there shortly before the bird was seen here. [The places are about fifteen miles apart.] At the beginning of August 1839, I went to Scotland and got nine young birds at Douglas Castle; two of them died on the passage; I turned out the seven on the hill near the place where the old cock used to haunt, but none of them were ever seen afterwards that I know of. The reason I assign for their not succeeding at this time is, that I think they were too young, and not fit to manage for themselves without the help of the old bird. In November 1839, I again went to Douglas Castle, got six brace of full-grown birds, viz. seven hens and five cocks; I got them all safe over to Glenarm, where I kept them for two days, feeding them on corn till they recovered from the effects of the passage. I then turned them out in the park quite strong and healthy to all appearance. Some time after one of the cocks was found dead in the park; he was quite light and thin of flesh. One of the cocks was shot about the same time in Glenariff, about eight miles from Glenarm. A few of them kept about the park all winter. Sometimes one would be seen, sometimes two, and in the month of March there were three hens and one cock seen together, but about the beginning of May all the hens disappeared, and none of them have been seen since. One cock kept the park all summer, and was seen lately, which is all that I know of here, out of the twelve brought over. One cock was shot about two months ago by a gentleman near Ballycastle, [about twenty miles distant,] which is likely to be another of them. Where all the hens have gone to I cannot say. I am still in hopes that some of them may be alive yet, as they are so much like grouse that people who are not acquainted with them would take no notice of them.

"I now come to your last query, which is, *If they ever bred? and if they did not succeed, the reasons assigned for their not doing so?* Now I really confess I cannot assign any satisfactory reason whatever, as I have no doubt that full-grown birds would live as well in Ireland as they do in Scotland, if they were only let alone. What I am most doubtful about is, whether they will breed as well; and the reason I am doubtful about this is, that when I was in Scotland, keeper with Lord Douglas, at Douglas Castle, where black game are very plentiful, in hunting the dogs over the ground I used to find all the young broods of black game, *not among heath or moss ground where young grouse generally are, but on white or green ground, where sprat and rushes* are plenty, and where you will seldom find young

grouse. But when they get strong and able to do for themselves they get into packs, often to the number of forty or fifty, and fly over the whole country and take both to the woods and corn-fields —when at Douglas last I was talking to Lord Douglas's keeper about what he thought the young birds fed on. He said that early in the season he had caught some young birds, intending to tame them and learn them to feed, so that I might be better able to get them safe over, but they all died in a day or two. He cut open some of their crops to see what they fed on, and could observe nothing but the seed of the sprat or rush. Now, from the number of black cattle that are kept on the mountains in the north of Ireland, there is scarcely any sprat or rushes allowed to grow that would be of any use either for cover or food. I have seldom seen them sit when cattle go near them, and a crow flying over will make a score of them rise and fly away in the latter end of the season, when they are strong on the wing. With respect to the haunts and breeding-ground of young black game, I speak only from my own observations. I am not aware that they haunt the same kind of ground in other parts of the country, I merely wish to direct your attention to it. I know they are plenty in the island of Arran, but do not know what sort of ground they frequent there. As I mentioned before, none of the hens have been seen since the beginning of the breeding time: whether they began to hatch and were killed by some vermin, or wandered away in search of a more suitable place for their purpose, is a question I cannot answer. Lord Courtown's keeper was at Douglas Castle shortly after I was, in November 1839, and got away six brace to his lordship's estates somewhere south of Dublin, but I have not heard how they succeeded."

How different from this is the case at Ballantrae in Ayrshire, just opposite to Glenarm! When sporting there in 1839, I made the following note on the 20th of August, after returning from the first day's black game shooting.

"Within twenty years a black grouse was an extraordinary sight in the neighbourhood of Ballantrae in Ayrshire, and still later, not more than one or two individuals would be met with during a season's shooting. When first there, in the autumn of 1828, I saw numbers of these birds, chiefly about the corn-fields adjacent to the mountains, since which time they have been gradually increasing, and of late years have become abundant. This is doubtless attributable to the great increase of cultivation, or the growth of corn in the vicinity of the moors, for with its augmentation that of the black game has proportionally kept pace—within the period alluded to a vast quantity of mountain-land has been brought under cultivation in this district.

"In grouse ground we met with two or three small packs of black game today, but one pack was quite below the moor, and on looking to the crop of a young cock killed there, I found it filled with the flowers of all the plants which grew around—amongst them were those of *Euphrasia, Ranunculi, Cerastia, Carices,* but in quan-

tity much exceeding the others were those of the autumnal hawk-bit, *Apargia autumnalis*—to my veteran companion, who has shot here successively for about twenty seasons, this plant has long been known as a favourite food of the young black game—in addition to the flowers, were many leaves of a small willow, every one of which taken from the bird was infested with an insect nidus. It is in the evening chiefly that the black grouse resorts to the corn-fields, and this it does when the grain is green, as well as when ripe. Both black and red grouse killed late in the autumn, and in the course of the day, are not unfrequently found, when opened, to contain oats exclusively, which in such cases have been purloined in the early morning*. The farmers in this part of Ayrshire often complain of the damage done to their crops by these birds, especially by the black grouse. In reference to the common error that this bird increases at the expense of the red game, it may be stated that in this country the numbers of the latter have in consequence suffered no diminution." In the autumn of 1837 my friend first saw the hens of the black game packed, when fourteen and fifteen appeared together. He has seen as many as seventy black cocks in company.

The following instance of the carriage of the eggs of the black grouse to a considerable distance with perfect safety after their having been partly incubated, seems to me very interesting. In June 1833, Mr. Arbuthnot Emerson of Belfast had brought to him from Stranraer nine eggs taken from the nest of a black grouse. These eggs were placed under a bantam hen, and in one week, seven young birds made their appearance. Two of them soon died, but the remaining five lived for about a month, or until cold and wet weather set in, when they all died. The eggs were packed in feathers, and brought by the mail-coach from Stranraer to Portpatrick, where they were shipped on board the steam-packet, put into the mail again at Donaghadee, and in about twelve hours after being taken from the nest were placed under the bantam hen. On the same subject I have learned from Wm. Sinclaire, Esq., respecting a nest of partridge's eggs once brought to him from a distance of eight miles, that they were quite cold when received, but being placed under a common hen, the young birds came out in half the usual time, thus showing, that eggs when half incubated can be carried to a distance without their vitality being impaired. The same gentle-

* Mr. Colquhoun, in his work entitled 'The Moor and the Loch,' states, from the circumstance of heather never having been found in any black grouse opened by him, that the species never eats it; but this will not apply generally, as proved in the case of birds examined by myself. Examples shot in Scotland, and set up by bird-preservers in Belfast are alluded to, as the contents of their gizzards only have I noted down. They were five in number, and killed in the months of October, November, and January. The first contained oats and the tops of heath, which had given a pink tinge to the grain; the second, the twigs of heath and other plants; the third, a quantity of oats; the fourth, portions of a woody plant, perhaps heath; the fifth was, excepting many pebbles, entirely filled with yellowish green woody matter, consisting in part, if not altogether, of the bilberry plant (*Vaccinium Myrtillus*),—they all contained many pebbles.

man informs me, that having once "set" nine eggs of the domestic hen, he by mistake, at the expiration of two, instead of three weeks, went to examine them, and lifting each egg shook it violently, to ascertain if it were addled. He concluded that all were in this state, and thought no more of the matter until a week afterwards, (the twenty-one days having expired,) when the hen appeared strutting about with seven or eight chickens; the violent shaking in this instance of eggs two-thirds incubated did not injure the contained chick. Mr. Sinclaire has known his tame pigeons remain off the nest all night when their eggs were half incubated, and though, as in the case of those of the partridge, they felt quite cold, no injury arose from this circumstance.

Ptarmigan, *Tetrao Lagopus*, Sabine.—As remarked by me elsewhere, "the *T. Lagopus* is not now, nor do I conceive ever was, indigenous to this island. There seems not to be in any part of Ireland a continuity of mountains of sufficient altitude to be suited to the ptarmigan's abode." This species is known to so few persons, that the following note may perhaps be worth insertion.

"Dec. 1835.—My relative Robert Langtry, Esq. (of Fortwilliam, Belfast,) informs me that when at shooting quarters last autumn in Ross-shire—on the banks of the Beulay, and close to Loch Monar—he on several days shot four or five brace of ptarmigan. When his dogs pointed and the birds were but a few yards distant, so great was their assimilation in colour to the surrounding rocks, that he could not distinguish them so long as they remained motionless. They soon, however, stretched their necks and *walked* off before the dogs, and on being further disturbed took wing, but only to alight like a flock of pigeons on the tops of the adjacent stones. My friend verifies the accounts of their being easy of access, but states that, like other game, they are wild when the ground is wet."

[To be continued.]

IV.—*On the existence of Siliceous? Spiculæ in the exterior rays of* Actinia. By G. W. Bailey, Prof. Chem. Min. and Geol. U. S. Military Academy*.

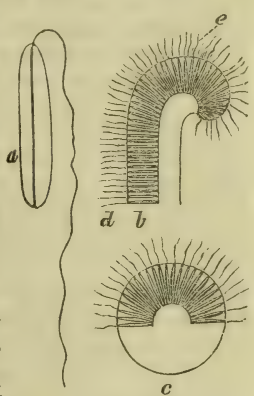
During a recent visit to Boston in April, I eagerly embraced the long-wished-for opportunity to examine the marine siliceous infusoria of our coast; for I hoped to be able to detect, in a living state, some of those elegant forms which occur so abundantly in the fossil infusorial strata of the marine tertiary of Virginia. I was aware that Ehrenberg had detected many of these forms in a living state in the sea at Cuxhaven and elsewhere, and I felt confident that our shores must abound in similar forms. In company with Dr. Gould, I visited the docks near the Chelsea ferry, and collected from the immersed logs, &c. a quantity of filamentous algæ, among which I knew that many of the objects of my

* From the Boston Journal of Natural History, vol. iv. No. 2.

search were likely to be entangled. On subjecting them to a microscopic observation I detected a number of very interesting and beautiful forms, although the season was not the most favourable. The first objects that attracted my attention were great numbers of siliceous spiculæ, precisely similar to those found fossil in the infusorial strata above referred to; these I found among the algæ, and also more abundantly in the mud of the docks. These spiculæ resemble those found in some species of *Spongia* and *Tethya*, and I believe that Ehrenberg refers the fossil ones to these genera; but an observation which I made leads me to suspect that some of them, at least, are derived from the exterior rays of *Actinia*. On examining with a high magnifying power the rays of a large species of *Actinia* which had an orange-coloured base and olive rays (*A. marginata*, Lesueur ?), I found that the white rays which form the exterior circle appeared to differ from all others, being filled with spiculæ arranged with great regularity and in countless numbers, radiating from the axis of each arm (see fig. 1, *b* and *c*). Each of the spiculæ was perforated with a longitudinal cavity, from which was protruded a very long and delicate fibre (see fig. 1, *a*). These spiculæ resembled so much in their form, perforation, and general appearance, some of the fossil siliceous spiculæ above referred to, that, like the fossil ones, they must be siliceous. This question I had not the means of deciding, but I hope it will be settled by some of the Boston naturalists.

It is only necessary to burn one of the rays and examine the ashes; the siliceous spiculæ will of course retain their form after ignition. It would be an interesting fact, if, by means of these spiculæ, we could obtain evidence of the existence of species of *Actiniæ* during the epoch of Eocene tertiary; for who would expect that such soft and perishable creatures could leave, for such a length of time, any trace of their existence?

The annexed sketches were made merely as memoranda, as I hoped to have further opportunities for observation. They will serve to indicate the form and position of the spiculæ, although they have no pretensions to accuracy.



EXPLANATION OF FIGURES.

a One of the spiculæ from a white external ray of *Actinia marginata*? showing its longitudinal perforation and the long projecting filament, much magnified.

b Ideal longitudinal section of a ray to show the manner in which the spiculæ are arranged; at *d* are seen the vibrillæ, and at *e* the long filaments.

c Ideal cross section of the ray.

V.—*Retrospective Comments.* By Prof. Edward Forbes, V.P.W.S., F.L.S., F.B.S. &c.

An absence of eighteen months in countries where natural-history periodicals have not yet ventured to circulate, and where, while a glimmering notion of the progress continually going on in science might be gathered from an occasional letter, the published details of what was doing could not be obtained, obliges a naturalist to make himself acquainted with a long arrear of accumulated matter which it is his duty to learn ere he starts anew. The occupation is however anything but irksome, and those whom inclination or professional pursuits keep at home can scarcely conceive the pleasure of sitting down to turn over the pages of three volumes of unperused 'Annals.' Under such circumstances too do we see the progress of things. When in the midst of the scientific world, gathering its news day by day, and reading its chronicles month after month, we are apt to fancy that little is doing and that there is a stagnation of research; but when the doors of the workshop have been closed against us for some time, the work which has been made strikes us far more on our return than if we had watched its progress step by step. Such was my feeling this winter on receiving the numbers of the 'Annals' which had been published during my absence abroad. Among their contents are many papers and notices, on the subjects of which light may be thrown by stray observations from the note-book or by short comments. As they are not a few, I prefer gathering them together in an article to printing them as disjointed remarks, presenting them in chronological order.

I. In the 45th Number of the 'Annals' (July 1841) Mr. Hassall has constituted a genus, *Echinocorium,* for the reception of *Alcyonidium echinatum* and what he supposes to be its polype, but which is only a species of *Coryne* attached to the *Alcyonidium.* Having frequently taken both the zoophytes in question when dredging in the Irish sea, and having carefully examined and drawn them when alive, I can say this without a doubt. The *Coryne* is a common deep-sea form of that genus, usually of a pale or white colour, and having much shorter tentacula than the *Coryne squamata.* It is by no means constantly associated with the *Alcyonidium,* though, from the excellent holding afforded by the latter, it perhaps prefers such a residence, but is also found on the bare surfaces of old shells. The polype of the *Alcyonidium echinatum* I have never seen, but believe, from analogy, to be ascidioid. Had Mr. Hassall looked a little closer to his specimens, he would have found that there is no organic connexion between the parasite and its base, and that each *Coryne* is an independent animal, capable of detachment without injury. Dr. Johnston,

whose opinion on these matters is of much more consequence than mine, takes a similar view of the too hastily constituted genus *Echinocorium* with that which I have here advanced.

II. In the 51st Number (Dec. 1841) there is a short paper sent by me from Paros, containing an account of two remarkable Marine Invertebrata inhabiting the Ægean. To these animals I then abstained from giving names, fearful of carelessly multiplying synonyms in the absence of the works necessary for consultation. To one of them, the zoophyte of the family *Actiniadæ,* I have now given a distinctive appellation.

M. de Quatrefages, one of the few zoologists of France who make the natural history of their country a favourite study, treading in the honourable path of Milne Edwards, has lately published many admirable memoirs on the marine animals of the Channel in the 'Annales des Sciences Naturelles.' In the number for August 1842, he has described and figured three new polypes allied to *Actinia* from the sea near Granville, and has constituted a genus for their reception. To this well-founded and carefully studied genus does my curious tube-making polype from the Ægean belong. I rather rejoice that I did not bestow a generic name on the creature when I wrote the paper above referred to, inasmuch as it must now rank as a species of *Edwardsia,* M. Quatrefages having given that worthy name to his genus. As the animals he describes may probably be found on our own shores, I transcribe their diagnoses, as well as his generic character, for the use of British observers.

Corpus liberum, vermiforme; pars media plus minusve epidermate opaco incrassata; pars anterior pellucida, tentaculis ornata; posterior autem vitrea, rotundata, basi vix instructa; utraque exsertilis et retractilis.

Intestinum rectum, mesenterio interrupto suspensum, posterius large apertum, duabus partibus compositum; sinus octo posteriori intus eminentes quibus pendent totidem ovaria, usque ad extremum abdomen producti.

1. *E. Beautempsii.* Ore terminali in extremitate papillæ subconicæ, circum basim tentaculatæ; tentaculis 14—16 uniseriatis parte media subpolygonali; epidermate crassa, opacissima, fulva rubente. Long. 6—7 cent.

2. *E. timida.* Apice plano, tentaculis 20—24 uniseriatis circumdato; parte media vix subpolygonali; epidermate tenui paululum translucida, fulva. Long. 6—7 cent.

3. *E. Harassi.* Papilla terminali rotundata, tentaculis 24 biseriatis ad basim circumdata; parte media cylindrica; epidermate crassa, opacissima, obscure fulva. Long. 5½ cent.

The Paros species adds a fourth to the genus. I propose for

it the name of *Edwardsia vestita*, with the following diagnosis, referring for a full description to my former account of it.

4. *Edwardsia vestita.* Apice plano, tentaculis biseriatis, exterioribus 32 longioribus; parte media cylindrica; epidermide crassa, translucida. Long. 3—4 unc.

III. In the 8th volume of the 'Annals' are some interesting papers by the Rev. D. Landsborough and Mr. Hassall on the Phosphorescence of Zoophytes. Before however we can assert the general phosphorescence of that class of animals, we must have many more observations than can be furnished by an examination of British species only. The general fact has long been known to British naturalists, though but little has been written about it, more precise observations than we have yet on record being required. These we must still attend. In the Medusæ and Tunicata the light appears to be derived from special organs (see Wagner's observations on this subject), and in polypes will probably be found to proceed from similar points.

[To be continued.]

VI.—*Characters of several new Species of Brazilian Mammalia.* By Dr. A. Wagner of Munich*.

Most of the animals of which the following are the diagnoses are contained in the collection at Vienna; those from Munich have *Mus. Monac.* affixed to them, and there is one new species for the use of which I am indebted to the kindness of Dr. Rüppell. With respect to the names of the species, I have adhered to the rule laid down in Schreber's work, to leave unaltered the names of species as given in the collections if found by me to be new, and even when I have arranged the species under a different genus.

Callithrix brunnea, Natt. *C.* saturate fusca, tænia frontali lata manibusque nigris; vellere breviori, adpresso, stricto.—Altitudo a vertice ad anum 12½″, cauda 17½″.

Callithrix caligata, Natt. *C.* dilute fuscescens, pilis dorsi nigro flavoque annulatis, gastræo genisque cupreo-rufis, manibus sincipiteque nigris.—Altitudo 12½″, cauda 14½″.
Borba et Rio Solimoëns.

Chrysothrix entomophaga, D'Orb.† *C.* serina, supra nigro-mixta, capite supra aterrimo, antibrachiis manibusque splendide aureo-fulvis. —Altitudo 11″, cauda 14½″.
Rio Mamoré.

Hapale chrysoleucos, Natt. *H.* albida, manibus caudaque splendide rutilo-fulvis, auriculis albo-penicillatis.—Altitudo 9″, cauda 12½″.
Borba.

* From Wiegmann's "Archiv," vol. viii. Part 6.

† Although this species has been figured by D'Orbigny under the name of *Callithrix entomophaga*, it has not yet been described.

Phyllostoma excisum, Wagn. *P.* ferrugineo-brunneum, subtus brunescens, prosthemate lanceolato, auriculis elongatis, emarginatis; cauda patagioque anali nullis.—Altitudo a vertice ad anum 2″, antibrachium 1″ 6‴.
Ypanema. Mus. Monac.

Lutra solitaria, Natt. *L.* supra castaneo-fusca, subtus sordide albida, rhinario nudo; cauda conica sensim attenuata, utrinque paululum fimbriata; vellere laxo.—Corpus 2′ 5″, cauda 1′ 3″.
Ypanema.

Didelphys pœcilotus, Natt. *D.* pilis laneis albidis, sericeis partim basi albis, apice nigris, partim [at rarissime] totis albis, capite albo anguste tristriato, auriculis albido-carneis, nigro-maculatis.—Magnitudo fere D. cancrivoræ.
Angaba.

Didelphys dichura, Natt.* *D.* cano-rufescens, subtus albido-lutescens; cauda longitudine corporis, albido-carnea, supra fusco-maculata, subtus apiceque immaculata.—Corpus 8½″, cauda 9″.
Ypanema.

Didelphys affinis, Natt. *D.* supra rufescens, subtus albido-lutescens; cauda corpore paulum longiore, supra subtusque usque ad finem albido-maculata; mastotheca nulla.—Corpus 9″, cauda 10″.
Matto grosso.

Didelphys ochropus, Natt. *D. lanigeræ* similis, at minor, magis rufescens, capitis, colli truncique lateribus canescentibus; cauda fere dimidia nuda.
Barra.

Didelphys macrotarsus, Natt.† *D. murinæ* similis; auriculis multo majoribus; cauda tota nuda, saturate rubello-cinerea; pedibus posterioribus elongatis robustis.

Didelphys microtarsus, Natt. *D. murinæ* similis; auriculis multo longioribus; cauda saturate rubello-cinerea, subtus tenuissime pilosa; pedibus posterioribus abbreviatis gracilibus.

Didelphys domestica, Natt. *D.* luteo-grisea, subtus pallide lutescens, auriculis majusculis, capite haud striato; cauda abbreviata, crassiuscula, pilis albis brevissimis paucissimis vestita; mastotheca nulla.—Corpus 7″, cauda 2″ 4‴.
Cuyaba.

Didelphys glirina, Natt. *D.* cinerascens, subtus pallide cano-lutes-

* Both *D. dichura* and *D. affinis* are liable to be confounded with *D. Philander*. The diagnosis for *D. Philander* might be as follows: *Didelphys* supra rufescens aut canescens, subtus albido-lutescens; cauda corpore multum longiore, parte nuda fusca, dein alba, supra subtusque fusco-maculata, apice longo immaculata albido-carnea; mastotheca ventrali.—Corpus 11″ 2‴, cauda 15″, pars pilosa 2″ 9‴.

† *Didelphys macrotarsus* and *microtarsus* may have been confounded with *D. murina*, Neuw., which may be avoided by adopting the following diagnosis for *D. murina*: *D.* auriculis minoribus, pedibus posterioribus gracilibus, cauda nuda clare rubello-albida.

cens, lateribus ochraceis, capite abbreviato, auriculis mediocribus; cauda dimidio corpore paululum breviore, basi pilosa, dein nudiuscula.—Corpus $6\frac{1}{2}''$, cauda $2''$ $7'''$.
Mamoré.

Didelphys velutina, Natt. *D.* murino-fusca, subtus abrupte albida; cauda tota [basi excepta] pilis brevissimis adpressis glabris fuscis vestita.—Corpus $3\frac{3}{4}''$, cauda $2\frac{3}{4}''$.
Ypanema.

Didelphys unistriata, Natt. *D.* supra-ferruginea, cano-mixta, subtus rufescens, stria dorsali obscuriori, cauda abbreviata pilosiuscula.—Corpus $5\frac{1}{4}''$, cauda $2\frac{1}{2}''$.
Ytarare.

Sciurus igniventris, Natt. *S.* supra e nigro flavoque mixtus, subtus pedibusque saturate ferrugineo-rufis, interdum corpore toto nigro; cauda basi nigra, dein maximam partem ferruginea.—Corpus $11\frac{3}{4}''$, cauda $13''$.
Rio Negro.

Sciurus pyrrhonotus, Natt. *S.* supra pedibusque extus saturate ferrugineo-rufus, subtus abrupte flavido-albescens; cauda ferruginea, basi macula magna nigra notata.—Major quam *Sciurus Langsdorffii.*
Borba.

Cercolabes melanurus, Natt. *C.* pilosissimus, pilis nigris serinisque coloratis, aculeis intermixtis; cauda longissima, aterrima, basi sola supra excepta; pedibus nigris.—Corpus $15\frac{1}{2}''$, cauda $17''$ $5'''$.
Rio Negro [Barra].

Loncheres macrura, Natt. *L.* supra fulvescens, lateribus pallidior, subtus e cano lutescens; cauda fere corporis longitudine, nudiuscula, pilis nonnullis brevissimis albidis vestita.—Corpus $10\frac{3}{4}''$, cauda $10''$.
Borba.

Loncheres nigrispina, Natt. *L.* supra nitide brunneo-fulvida, nigro-irrorata, subtus pedibusque albido lutescens, rostri lateribus cano-lutescentibus; cauda [basi crassa excepta] dense et æqualiter fusco-pilosa, apice haud penicillata.—Corpus $9\frac{1}{4}''$, cauda $6''$.
Ypanema.

Loncheres unicolor, Rüpp.* *L.* unicolor et dilute ferrugineo-brunnea, subtus pedibusque pallidior, cauda longius pilosa; vellere rigido sicco, pilis nonnullis planis, canaliculatis, angustis dorsalibus intermixtis.—Corpus $10''$ $9'''$, cauda $7''$ $9'''$.
Brasilia.

Hesperomys [*Oxymycterus*] *rostellatus*, Wagn. *H.* supra ex flavo nigroque variegatus, subtus ochraceus; cauda corpore multum breviore, unicolore, nigra.—Corpus $6''$ $3'''$, cauda $3''$ $10'''$.
Brasilia. Mus. Monac.

* Catalogue of the Collections in the Museum of the Senckenberg Natural History Society. I am not acquainted with the nature of the molar teeth.

Hesperomys arviculoides, Pict.* *H.* olivaceo-brunneus, nigro-adspersus, subtus pedibusque canus, cauda dimidii corporis longitudine, dense pilosa; vellere nitido molli.—Corpus 5″ 5‴, cauda 2″ 8‴.
Brasilia. Mus. Monac.

Hesperomys orobinus, Wagn. *H.* supra brunneo-flavus, subtilissime nigro-adspersus, subtus flavido-albescens, auriculis postice nudis, pedibus fuscis; cauda corpore multum breviore, squamata, nigricante.—Corpus 5″, cauda 3″ 5‴.
Brasilia. Mus. Monac.

Hesperomys subflavus, Wagn. *H.* supra brunneo-flavidus, subtus albidus, pedibus sordide albidis; cauda longitudine corporis, squamata, raripilosa.—Corpus 6″, cauda 6″.
Brasilia. Mus. Monac.

Dasyprocta nigricans, Natt. *D.* tota e nigro alboque variegata, tergo concolore.—Corpus 22″.
From Borba on the Madairo, and from Rio Negro above Cocuy.

VII.—*Descriptions of* Chalcidites *discovered by* C. Darwin, Esq. By Francis Walker, Esq., F.L.S.

Thoracantha Latreillii, Fem. *Nigro-cyanea, antennæ piceæ, pedes fulvi, femora fusca, alæ limpidæ.*

Thoracantha Latreillii, *Guérin, Icon. Règne Anim., Insectes*, pl. 67.

Corpus gibbum, altum, compressum, incurvum, convexum, nigro-cyaneum, nitens, glabrum: caput parvum, transversum, declive, subtilissime striatum; vertex sat latus; frons impressa, ad os angustior: oculi rufi, mediocres, non extantes: ocelli 3, remoti, rufi, triangulum fingentes; medius perparum antepositus: antennæ piceæ, parvæ, graciles, extrorsum crassiores, apice fulvæ, capite vix longiores; articulus 1^{us} longus, sublinearis; 2^{us} cyathiformis; 3^{us} et 4^{us} minimi; 5^{us} et sequentes breves, approximati; clava conica, articulo 10° duplo longior: thorax maximus: prothorax brevissimus; sternum parvum; dorsum minimum, supra non conspicuum: mesothoracis scutum transverse striatum, longitudine latius, per medium obsolete sulcatum; parapsidum suturæ bene determinatæ, postice approximatæ; scutellum transversum, breve, subtilissime rugulosum, per medium obsolete sulcatum: metathoracis dorsum maximum, subtilissime rugulosum, quasi bipartitum; pars antica longitudine vix latior, per medium obsolete sulcata; pars postica longior, fissa; fissura postice dehiscens, similitudine *Melvidis* elytrorum, abdominis apicem attingens: petiolus vix conspicuus: abdomen compressum, apice subtilissime rugulosum, basi læve, thorace paullo brevius et angustius; segmentum 1^{um} dorsum et sternum omnino obtegens: pedes fulvi, graciles, simplices, subæquales; coxæ nigro-cyaneæ; trochanteres picei; femora fusca; tarsis articuli 1° ad 4^{um} curtantes, 5^{us} 4° paullo longior; ungues et pulvilli minuti: alæ limpidæ, parvæ; squamulæ fulvæ; nervi albidi, vix conspicui, basi fulvi; nervus humeralis ulnari multo longior, radialis vix ullus, cubitalis brevissimus; stigma minimum. (Corp. long. lin. 2; alar. lin. 3.)
Brazil.

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* I have retained the name of *Mus. arviculoides*, Pictet, which was written on the label of the specimen when purchased.

Micromelus Silanus, Fem. *Æneo-niger, cyaneo-varius, antennæ fulvæ, pedes fulvi, alæ fuscæ.*

Corpus æneo-nigrum, subtus cyaneo-nigrum, breve, latum, convexum, parum nitens, scitissime squameum, parce hirtum: caput transversum, breve, thorace latius; vertex latus; frons impressa, abrupte declivis: oculi picei, mediocres, non extantes: ocelli vertice triangulum fingentes; medius perparum antepositus: antennæ fulvæ, ad os insertæ, basi graciles lineares: os piceum: thorax ovatus: prothorax brevissimus: mesothoracis scutum longitudine latius; parapsides scuto fere in unum confusæ; paraptera et epimera magna; scutellum subrhombiforme, postice latius: metathorax brevis, declivis, postice angustus: petiolus brevissimus: abdomen subrotundum, æneum, nitens, læve, supra planum, subtus carinatum, thorace paullo latius et multo brevius: pedes fulvi, simplices, subæquales: alæ fuscæ, mediocres; squamulæ piceæ; nervi fusci; nervus humeralis ulnari duplo longior, radialis ulnari brevior cubitali vix longior, cubitalis sat longus; stigma mediocre. (Corp. long. lin. $\frac{3}{4}$; alar. lin. $1\frac{1}{4}$.)

Mount Wellington.

VIII.—*Descriptions of* Chalcidites *discovered in St. Vincent's Isle by the* Rev. Lansdown Guilding. By Francis Walker, Esq., F.L.S.

Decatoma Oretilia, Mas et Fem. *Fulvo-flava ferrugineo-varia, antennæ fulvæ, pedes flavi, alæ limpidæ.*

Corpus convexum, sublineare, fulvo-flavum, nitens, subtilissime punctatum, parce hirtum: caput transversum, breve, thorace paullo latius; vertex latus; frons impressa, abrupte declivis: oculi rufi, mediocres, non extantes: antennæ fulvæ, clavatæ, thorace non longiores; articulus 1^us^ longus, gracilis; 2^us^ cyathiformis; 3^us^ et 4^us^ minimi; 5^us^ et sequentes breves, usque ad 9^um^ latescentes; clava fusiformis, acuminata, articulo 9° multo latior et plus duplo longior: thorax ovatus: prothorax maximus, transversus, subquadratus, postice ferrugineo-maculatus: mesothoracis scutum brevissimum; parapsidum suturæ vix conspicuæ; scutellum subrotundum; discus ferrugineus: metathorax transversus, brevis: petiolus brevis: abdomen ovatum, læve, *mari* thoracis longitudine, *fem.* thorace paullo longius subtus carinatum apice acuminatum fuscum; vitta per dorsum interrupta fusca: pedes pallide flavi, simplices, subæquales: alæ limpidæ; squamulæ fulvæ; nervi fulvi; nervus humeralis ulnari fere duplo longior, radialis ulnari non brevior cubitali plus duplo longior; stigma minutum. (Corp. long. lin. 1; alar. lin. $1\frac{1}{2}$.)

Pteromalus Helice, Fem. *Æneo-viridis, antennæ fulvæ, pedes flavi, alæ limpidæ.*

Corpus convexum, æneo-viride, nitens, scitissime squameum, parce hirtum: caput transversum, breve, thorace latius; vertex latus; frons impressa, abrupte declivis: oculi rufi, mediocres, non extantes: antennæ fulvæ, extrorsum crassiores, thorace vix longiores; articulus 1^us^ longus, gracilis; 2^us^ cyathiformis; 3^us^ et 4^us^ minimi; 5^us^ et sequentes breves, usque ad 10^um^ latescentes; clava longiconica, acuminata, articulo 10° duplo longior: thorax ovatus: prothorax transversus, brevissimus: mesothoracis scutum longitudine latius; parapsidum suturæ vix conspicuæ; scutellum subconicum, antice truncatum: metathorax obconicus, mediocris, declivis: petiolus brevissimus: abdomen fusiforme, læve, supra depressum, subtus carinatum, apice acuminatum, thorace longius et angustius: pedes læte flavi, simplices, subæquales: alæ limpidæ; squamulæ fulvæ; nervi flavi; nervus humeralis

ulnari multo longior, radialis ulnari vix brevior, cubitalis sat longus; stigma minutum. (Corp. long. lin. 1—1¼; alar. lin. 1¾—2.)

Var. β. Thorax æneus.

Genus Lelaps, *Haliday MSS.*

Fem. Corpus angustum, sublineare, convexum, nitens, scitissime squameum, subtus læve, parce hirtum: caput transversum, breve, thoracis latitudine; vertex angustus; frons impressa, abrupte declivis: oculi magni, non extantes: ocelli vertice triangulum fingentes: antennæ gracillimæ, extrorsum crassiores, pubescentes, corpore paullo breviores; articulus 1^{us} longus, gracilis; 2^{us} longicyathiformis; 3^{us} et 4^{us} minimi; 5^{us} et sequentes longi, usque ad 10^{um} curtantes et latescentes; clava linearis, apice obtusa, articulo 10^{o} longior: thorax longiovatus: prothorax brevis, antice angustus: mesothoracis scutum longitudine latius; parapsidum suturæ bene determinatæ, postice approximatæ; scutellum obconicum?: metathorax mediocris, obconicus, declivis: petiolus brevissimus: abdomen longiovatum, breve, subtus profunde carinatum, thorace longius; segmentum 1^{um} maximum: oviductus exsertus; vaginæ abdomine paullo breviores: pedes longi, graciles, simplices, subæquales; tarsorum articuli 1^{o} ad 4^{um} curtantes, 5^{us} 4^{o} paullo longior; ungues et pulvilli minuti: alæ mediocres; nervus humeralis ulnari non longior, radialis ulnari brevior alæ apicem fere attingens, cubitalis sat longus; stigma minimum.

Lelaps pulchricornis (Haliday MSS.), Fem. *Cuprea, antennæ fuscæ flavo-cinctæ, pedes flavi, proalæ fusco-nebulosæ.*

Corpus cupreum, viridi-varium: oculi et ocelli rufi: antennæ fuscæ, flavo-cinctæ, apice flavæ; articulus 1^{us} flavus: oviductus vaginæ fulvæ, apice fuscæ: pedes flavi; ungues et pulvilli fusci: alæ limpidæ; proalæ fusco-nebulosæ; squamulæ fulvæ; nervi fulvi. (Corp. long. lin. 1½; alar. lin. 2¾.)

Genus Idarnes.

Corpus sublineare, depressum, læve, nitens, parce hirtum: caput transversum, breve, thoracis latitudine; vertex sat latus: palpi biarticulati: oculi mediocres, non extantes: antennæ breves, clavatæ; articulus 1^{us} longus, validus; 2^{us} cyathiformis; 3^{us} et sequentes brevissimi: thorax ovatus: prothorax magnus, transversus: mesothoracis scutum impressum, longitudine latius; parapsidum suturæ remotæ, bene determinatæ, postice approximatæ; scutellum magnum, transversum, bisulcatum: metathorax magnus, subquadratus: petiolus vix ullus: abdomen longi-ovatum, thorace paullo longius non latius; segmentum 1^{um} magnum, 2^{um} et sequentia brevia: oviductus longissimus; vaginæ corpore triplo longiores: propedum coxæ magnæ; femora crassa; tibiæ latæ: mesopedes graciles; coxæ parvæ: metapedum coxæ sat magnæ; femora crassa; tibiæ subarcuatæ: tarsorum articuli 1^{o} ad 4^{um} curtantes, 5^{us} 4^{o} paullo longior; ungues et pulvilli minuti: alæ mediocres; nervus humeralis longus, ulnaris brevissimus, radialis longus ulnari vix brevior, cubitalis longissimus, arcuatus, ulnari longior; stigma minimum.

Idarnes Carme, Fem. *Viridi-æneus, abdomen cupreum, antennæ nigræ, pedes fulvi, alæ limpidæ.*

Corpus viridi-æneum: oculi et ocelli rufi: antennæ nigræ: abdomen cupreum: oviductus fulvus; vaginæ nigræ: pedes fulvi; ungues et pulvilli fusci: alæ limpidæ; squamulæ fulvæ; nervi flavi. (Corp. long. lin. 1; alar. lin. 1¾.)

Encyrtus Gargaris, Mas. *Viridis, abdomen cupreum, antennæ fulvæ, pedes fulvi, alæ albo-limpidæ.*

Corpus breve, convexum, viride, nitens, scitissime squameum, parce

hirtum: caput transversum, breve, thoracis latitudine; vertex latus; frons impressa, abrupte declivis: oculi picei, mediocres, non extantes: antennæ fulvæ, submoniliformes, extrorsum crassiores, thorace non longiores; articulus 1^{us} longus, gracilis; 2^{us} cyathiformis; 3^{us} et sequentes transversi; clava conica: thorax ovatus: prothorax minimus, supra non conspicuus: mesothoracis scutum magnum, planum, longitudine non latius; parapsidum suturæ non conspicuæ; scutellum obconicum: metathorax transversus, brevissimus: petiolus vix ullus: abdomen depressum, obconicum, cupreum, læve, thorace multo brevius: pedes fulvi; mesotarsi et metatarsi pallidiores, apice fusci: alæ albo-limpidæ; squamulæ piceæ; nervi fulvi; nervus humeralis nullus, ulnaris costæ dimidii longitudine, radialis brevissimus, cubitalis sat longus; stigma minutum. (Corp. long. lin. $\frac{1}{2}$; alar. lin. $\frac{3}{4}$.)

Reared from a larva.

Euplectrus Furnius (bicolor?), Mas. *Ater, abdominis discus fulvus, antennæ fuscæ, pedes fulvi, alæ limpidæ.*

E. bicolori simillimus. Corpus convexum, atrum, nitens, læve, pilis albis parce hirtum: caput transversum, brevissimum, impressum, vix thoracis latitudine; vertex latus; frons abrupte declivis: oculi rufi, mediocres, vix extantes: antennæ fuscæ, filiformes; thorace longiores; articulus 1^{us} longus, gracilis, flavus, apice fuscus; 2^{us} cyathiformis; 3^{us} et sequentes ad 6^{um} mediocres, subæquales; clava ovata, articulo 6° longior: thorax ovatus: prothorax angustus, mediocris, conicus: mesothoracis scutum longitudine latius; parapsidum suturæ non bene determinatæ; scutellum subovatum: metathorax obconicus, sat magnus, declivis: petiolus gracilis, sat longus: abdomen subconicum, depressum, thorace multo brevius; segmentum 1^{um} magnum, 2^{um} et sequentia brevia; discus fulvus: pedes fulvi, simplices, subæquales; ungues et pulvilli fusci; mesotibiæ apice spina sat longa armatæ: alæ limpidæ; squamulæ fulvæ; nervi flavi; nervus humeralis ulnari multò longior, radialis ulnari multo brevior cubitali paullo longior; stigma minutum. (Corp. long. lin. 1; alar. lin. $1\frac{3}{4}$.)

Paphagus, n. g.

Fem. Corpus sublineare, depressum, nitens, læve, parce hirtum: caput transversum, breve, thoracis latitudine; vertex latus; frons impressa: oculi mediocres, non extantes: antennæ clavatæ, pubescentes, prope os insertæ, thorace non longiores; articulus 1^{us} validus, sublinearis; 2^{us} longicyathiformis; 3^{us} et sequentes usque ad 6^{um} latescentes; clava ovata, acuminata, articulo 6° longior et latior: thorax ovatus: prothorax transversus, brevis: mesothoracis scutum longitudine latius; parapsidum suturæ non bene determinatæ; scutellum transversum, latum: metathorax mediocris, transversus, postice angustus: petiolus brevis: abdomen ovatum, supra depressum, subtus carinatum, apice acuminatum, thorace non longius: pedes simplices, graciles, subæquales; tarsorum articuli 1° ad 4^{um} curtantes; ungues et pulvilli minuti: alæ mediocres; nervus ulnaris humerali paullo longior, radialis nullus, cubitalis brevis; stigma minutum.

Paphagus Sidero, Fem. *Cupreus, abdomen basi cyaneum, antennæ fuscæ, pedes flavi, alæ limpidæ.*

Cupreus: oculi picei: antennæ fuscæ; articulus 1^{us} flavus: mesothoracis scutum viridi-varium; scutellum purpureo-varium: metathorax viridi-cyaneus: petiolus fulvus: abdomen basi cyaneum: pedes flavi; ungues et pulvilli fusci: alæ limpidæ; squamulæ fulvæ; nervi flavi. (Corp. long. lin. 1; alar. lin. $1\frac{1}{2}$.)

Telenomus Apitius, Fem. *Ater, antennæ nigræ, pedes picei, tarsi fulvi, alæ albo-limpidæ.*

Corpus breve, latum, crassum, convexum, atrum, rude rugulosum, parum

nitens, parce hirtum : caput transversum, breve, thoracis latitudine; vertex latus; frons convexa, abrupte declivis: oculi picei, mediocres, non extantes: antennæ clavatæ, nigræ, corpore breviores; articulus 1^{us} sublinearis, validus; 2^{us} longicyathiformis; 3^{us} et 4^{us} angusti; 5^{us} et sequentes latiores, clavam fingentes longam fusiformem : thorax ovatus: prothorax brevissimus, supra non conspicuus: mesothoracis scutum magnum, longitudine latius; parapsidum suturæ non conspicuæ ; scutellum mediocre, brevi obconicum: metathorax transversus, brevissimus: petiolus vix ullus: abdomen subovatum, scite rugulosum, thorace non longius; segmenta basi sulcata, 1^{um} magnum, 2^{um} et sequentia brevia: pedes picei, simplices, subæquales; trochanteres fulvi; genua fulva; tibiæ basi fulvæ; tarsi fulvi, apice fusci: alæ albo-limpidæ ; squamulæ fuscæ ; nervi fulvi ; nervus humeralis nullus, ulnaris costæ dimidio brevior, cubitalis longus radiali paullo brevior ; stigma minimum. (Corp. long. lin. $\frac{2}{3}$; alar. lin. 1.)

Reared from the eggs of an insect.

BIBLIOGRAPHICAL NOTICES.

Manual of British Botany, containing the Flowering Plants and Ferns, arranged according to the Natural Orders. By Chas. C. Babington, M.A., F.L.S., F.G.S., &c. &c. London : J. Van Voorst, 1843.

The present work is modelled after the well-known 'Synopsis Floræ Germanicæ' of the learned Koch, and is the result of a critical examination of our native plants, by a careful comparison of indigenous specimens with the works of eminent continental authors and with plants obtained from other parts of Europe, whereby a desideratum long wanted has been attained, viz. the assimilation of the nomenclature of British and continental writers. To effect this, our flora has undergone a general and scrutinizing revision, so as to determine what plants are really deserving of the rank of distinct species, and what must be regarded only as varieties; and those names have been adopted which possess the claims of priority by a careful examination of all the best European floras, comparing our plants with the descriptions contained in them, and in very many cases with foreign specimens of undoubted authenticity. In the adoption of genera and species an endeavour has been made, by the examination of the plants themselves, to determine which are truly distinct, thus taking nature as a guide, and not depending upon the authority of any name, however distinguished. As the volume is intended as a field-book, or travelling companion for botanists, the characters have been admirably and ably contrasted, and condensed as much as possible consistent with their accurate discrimination. Synonyms have been wholly omitted, except quotations of one British and one German figure to each plant. Localities are only given for new or peculiarly rare plants, though the general distribution through the British Isles, or in the several main portions thereof, and their character in that distribution, have been noted. The arrangement is that of the Natural System, but to render it generally available, a succinct synopsis of the Linnæan genera is added. To detail its many excellences would exceed our due limits, for fully to appreciate the scientific and critical accuracy and discrimination with which the

work has been elaborated, it must be carefully and constantly studied. We doubt not but that it will very speedily find its way (as it richly merits) into the hands of all true lovers of botany, and by them will assuredly be hailed as a successful attempt to display and enumerate the present state of our flora, and to establish it, for the first time, on a scientific equality with the advanced state of continental botany.

The Geographical Distribution of British Plants. By H. C. Watson, Part I. London, 1843. 8vo. Printed for the Author.

We feel much sorrow in having to inform our readers that this valuable work is not published, and must express our surprise at the reason; viz. the size to which it is expected to extend and the uncertainty of completion, since each portion is perfect in itself; and also our admiration of the author's great liberality in adopting so disinterested a plan. It is however to be hoped that he may be induced to alter his views and allow of its sale, since there must be many persons, to whom it cannot otherwise be attainable, who would highly appreciate its value. The part now before us contains the Orders *Ranunculaceæ, Nymphæaceæ* and *Papaveraceæ.* A general account of the distribution of each order throughout the world is first given, illustrated by very full comparative numerical tables: each species is then taken separately; its presence in one or more of the eighteen districts into which the author has divided Great Britain (for Ireland is excluded from want of data) is stated; a list of the local *floras* and *catalogues* in which it is included and of the places from which Mr. Watson has seen specimens follows, which is succeeded by a detailed account of its distribution in this country and other parts of the world; and the account of the species is concluded by a full list of the localities in which, on trustworthy authority, it is known to have been found. At the head of the account of each species two woodcuts are introduced, one of them being a small representation of the map of Great Britain divided into the author's eighteen districts, the other a diagram representing the relative heights to which the most elevated parts of each district attain. In both of these cuts its number is introduced into each of those districts in which the plant has been found, but is omitted in the others.

We have carefully examined many parts of the volume, and are much pleased to add our testimony to the great accuracy which is apparent in it, and consider it as a highly valuable contribution to British botany.

A History of British Forest Trees indigenous and introduced. By P. J. Selby, F.L.S. &c. 1 vol. 8vo. London, 1842.

We wish to call the attention of our readers to the above work. In it will be found very full accounts of all the trees which are usually planted for profit, and many which belong more peculiarly to the ornamental class. Each tree is illustrated by a beautiful woodcut of a full-grown specimen, and several others to exhibit the mode of branching, the leaves, or the botanical characters. The author's well-

known experience in planting and the great success which has attended his plans are so well known, that we need scarcely say that great attention has been paid to that portion of this work. On the whole, we consider the present volume as well deserving of its place in the well-known series of works on British Natural History, of which Mr. Van Voorst has procured the publication, but cannot conclude without expressing a hope that a little more attention will be paid to the botanical part in the preparation of a second edition.

Travels in New Zealand. By E. Dieffenbach, M.D., late Naturalist to the New Zealand Company. 2 vols. 8vo. London, 1843.

We consider this work as the most valuable addition that has been made of late to our knowledge of this highly interesting country. In connexion with a very full account of the topography of the northern island, of which the author traversed nearly all parts, it contains very full and interesting notices of its botany, zoology, and geological character. But what appears to us to be by far the most valuable portion of the book, is the insight which is derived from it into the manners, customs, state and prospects of the Aborigines. The high opinion that we had previously formed of these people is fully confirmed by the observations of Dr. Dieffenbach, than whom no person has had better opportunities of coming to a just conclusion on the subject. From his remarks, there can be no doubt that by judicious treatment they may soon become a highly civilized people and a most valuable body of British subjects, and that ultimately an admixture of their race with that of the English colonists will be an advantageous occurrence. We have not space for further remarks, but strongly recommend the book to our readers. Mr. J. E. Gray has furnished the author with a full list of the mammalia, reptiles, amphibia and mollusca; Mr. G. R. Gray of the birds; Dr. Richardson of the fishes; and Messrs. A. White and E. Doubleday of the annulose animals, which have been hitherto recorded as found in New Zealand, including many new species.

Repertorium Botanices Systematicæ. Auctore G. G. Walpers. Vol. i. and vol. ii. Part. I. 8vo. Leipsic, 1842–43.

This is a work which is quite essential to all botanists, and we can recommend it to them in the strongest terms. It is intended to form a Supplement to the invaluable 'Prodromus' of DeCandolle, and contains the characters of nearly all the new species that have been published since the appearance of the several volumes of that work.

Preparing for Publication.

The Viviparous Quadrupeds of North America. By John James Audubon, F.R.S. &c., and the Rev. John Bachman, D.D. &c.

The plan adopted by the authors, for the publication of this work, in a great degree corresponds with that pursued by Mr. Audubon in his large work on the 'Birds of America.' Many of the species are given of their natural size, and in most cases, several figures, with

trees, plants, and occasionally views drawn from nature, appear on each plate.

The work contains figures and descriptions of all the viviparous quadrupeds found in the United States, and from Texas, California, and the North-west Coast, to the British possessions and arctic regions of North America.

The work will be delivered to subscribers in numbers of five plates each, at intervals of two months from the publication of each number, making six numbers annually, and the whole work will be completed in about thirty numbers.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

Sept. 27, 1842.—William Yarrell, Esq., Vice-President, in the Chair.

Mr. Fraser, the naturalist to the Niger expedition, exhibited several new species of Quadrupeds, constituting part of his collection formed at Fernando Po; and Mr. Waterhouse, at the request of the Chairman, read his description of the new species, these having been placed in his hands for examination by Mr. Fraser.

Mr. Waterhouse first drew attention to a very interesting new genus of Rodents, which he characterized under the name

ANOMALURUS*.

Molares $\frac{4-4}{4-4}$, radicati. *Cranium* sine processu post-orbitali ossis temporalis, sed foramine antorbitali magno, partem musculi masseteris transmittente. *Palatum* anticè coarctatum, posticè emarginatum in formâ triangulari. *Cauda* modicè elongata et subfloccosa, parte basali triente subtùs scutis magnis in serie duplici longitudinalitèr dispositis (singulis angulo prominente) obtectâ. *Aures* magnæ, subnudæ. *Patagium* inter artus extensum. *Rhinarium* nudum. *Pedes* subtùs nudi; unguibus falcularibus, valdè compressis; pedes antici 4-dactyli, digitis subæqualibus; postici 5-dactyli, digitis subæqualibus, interno excepto, hoc breviore.

ANOMALURUS FRASERI. *An. vellere longo, permolli; corpore supèr nigro; dorso flavescenti-fusco lavato; fronte incanescente; corpore infrà albo, vel albido; artubus intus, patagio ad marginem et gutture fuliginoso tinctis.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	14	0
——— *caudæ*	8	6
——— *auris*	1	3
——— *tarsi digitorumque*	2	6

Hab. Fernando Po.

Upon a cursory inspection this animal would be regarded as a

* From ἄνομος, out of law, and οὐρά, a tail. Should this have been previously used in a generic sense in Natural History, the name Aroæthrus (from ἀρόω, to plough, and αἴθρα, air) may be substituted.

species of *Pteromys*, having most of the general external characters of the members of that group; there are, however, some points of distinction between the present animal and the large Flying Squirrels, which are important; of these the most conspicuous are the extraordinary scales which cover the under side of the basal third of the tail: these scales are of a pale horn-colour, sixteen in number in one of two specimens before me, and fifteen in the other, and arranged in two longitudinal series: each scale is narrow at the base and broad at the opposite extremity, and in fact nearly of a triangular form; but as the scales on one side alternate with those of the other, no interstices are left; they not only cover the under surface of the tail, but overlap the sides; in this overlapping of the scale a ridge is formed, the extremity of which is produced into an angle; the point of the angle is directed backwards. The portion of the tail which is thus protected beneath is well clothed with fur above, but the hairs are not long, and the apical portion (which is cylindrical) is much less bushy than in the large Flying Squirrels constituting the genus *Pteromys*. The hinder feet have the heel clothed with fur, but the outer margin beneath is naked, and not densely clothed, as in *Pteromys*. The lateral flying membrane extends from the wrist to the ankle, and is supported moreover by a long cartilage in front, as in *Pteromys*; but this cartilage has its origin at the elbow-joint, and not at the wrist, as in the genus just mentioned. The interfemoral membrane extends to the heel, and is moreover attached to the sides of the tail, and when expanded forms almost a straight line.

The ears are large, much longer than broad, and naked, excepting at the base on the outer side, where they are covered with long fur, like that on the body; the naked portion has a slight flesh-like tint, but is nearly white, as are also (Mr. Fraser's notes state) the naked portions of the feet and the tip of the muzzle. The hairs of the moustaches are very numerous, and although not very thick, are unusually long. The fur is long and remarkably soft, and the hairs of which it is composed are all of one kind; that is, there are no longer interspersed stronger hairs, such as we usually find in the fur of the Rodents; the fur on the upper parts is sooty black, but, excepting on the membranes, most of the hairs are rather broadly tipped with yellowish rust-colour: on the upper surface of the head the colour is replaced by grey; on the under parts of the body the fur is dirty white; the throat is blackish, and the under side of the throat is tinted with sooty grey. The under side of the membranes is sparingly clothed with hairs; towards the margin the hairs are more numerous, and of a blackish tint.

In the structure of the skull *Anomalurus* differs considerably from the known species of *Sciuridæ*. All the species of the family, the skulls of which I have had an opportunity of examining (and they are numerous, embracing all the known genera and subgenera), are distinguishable by the possession of a distinct post-orbital process to the cranium; they have the palate broad, and terminating in a line with the posterior molars, or behind that line; the molars of

opposite sides of the jaw are parallel, and the ant-orbital opening is small, in the form of a tube, and serves only for the transmission of the infra-orbital nerve. These characters are not found in *Anomalurus*: the post-orbital process is here reduced to a mere rudiment, being represented by an indistinct projection forming an obtuse angle: the ant-orbital opening is large, and evidently affords a passage for a portion of the masseter muscle as well as the nerve; it moreover opens directly in the bony plate which constitutes the anterior root of the zygomatic arch, and is not produced as it were into a tube, as in the typical Squirrels. The palate is narrow, and has a deep triangular emargination behind, the apex of the triangle being on a line with the hinder margin of the penultimate molar. The molar teeth converge in front, so that the space between the two foremost is scarcely equal in width to one of these teeth; the crowns of the molars of opposite sides of the upper jaw, instead of being on the same plane, or very nearly so, are directed obliquely outwards; and the masticating surface of those of the lower jaw, to meet them, incline in an opposite direction. The incisive foramina are longer than is usual in the *Sciuridæ*, and encroach in a slight degree upon the maxillary bones. The nasal portion of the skull is narrower, and the nasal bones are remarkable for a deep emargination in front.

I have been led to institute a comparison between the present animal and the species of the *Sciuridæ*, on account of certain points of resemblance which there exist between it and the Flying Squirrels (*Pteromys*), especially in the possession of the expanded flank and interfemoral membranes. In the almost total absence of post-orbital process, however, and in the comparatively large size of the ant-orbital opening, the *Anomalurus* evinces an approach to the *Myoxidæ*; the approximation is moreover observable in the narrowness of the nasal bones and the slenderness of the zygomatic arch, these parts being compared with those corresponding in the squirrel skull.

The lower jaw is formed like that of the Squirrels, and does not present certain peculiarities observable in the *Myoxus*, viz. that of having the descending ramus perforated, its posterior angle acute, and the upper posterior angle produced.

The incisor teeth are deeper than broad, and almost flat in front. The molars are permanently, it would appear, $\frac{4-4}{4-4}$, for in a skull of a young animal in which but three molars on either side of the jaw are protruded, there is no trace of the small anterior molar so commonly found in the Squirrels. They are very nearly equal in size, and of a quadrate form; the crown of each molar of the upper jaw is slightly indented, both on the outer and inner side, and the posterior inner angle is somewhat produced; in the young animal it is more distinctly produced and is acute, and the outer and inner indentations are scarcely traceable. The molars of the lower jaw have each a strong indentation on the outer side. The folds of enamel cross the crowns of the molars in the transverse direction, and the spaces between the folds (four or three in number) are about equal

in width to these folds. The masticating surfaces of these teeth are worn flat by usage, even in the comparatively young animal, as in other Rodents which have a large ant-orbital opening, and have not the tubercular surface such as we find in the molars of the typical Squirrels. These last-mentioned animals, it would appear, have a rotatory motion of the lower jaw, whilst the *Anomaluri* have a longitudinal, no doubt combined with the rotatory motion; and this difference is perhaps due to the action of that portion of the masseter muscle which passes through the ant-orbital opening.

The apparatus of scales, Mr. Fraser remarked, was used by the animal to support itself when resting on the trees, which it ascends with great agility. He had observed this animal dart from the top of a lofty tree to another at a considerable distance. Descending at an angle, it aimed with great nicety at the trunk of the tree on which it intended to alight, and, settling near the base, it would again ascend to travel to a third tree in the same manner; occasionally, when high up on the trunk, it would rest itself, making use of the singular apparatus of scales on the under side of the tail. The unarmed portion of the tail was then turned backwards and upwards.

Mr. Waterhouse then proceeded to characterize three new species of Squirrels from Mr. Fraser's collection, as follows:—

Sciurus Stangeri. *Sc. pilis longis et rigidis, nigro et flavescenti-penicillatis; genis, gulâ, corporeque subtùs pilis sparsè obtectis, his plerumque pallidis; caudâ magnâ, nigro alboque annulatâ; auribus parvulis; foramine infra-orbitali haud in canali educto.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	12	0
——— *caudæ*........................	15	0
——— *tarsi digitorumque*..............	2	$8\frac{1}{2}$
——— *auris*........................	0	5

Hab. in Insulâ Fernando Po.

The most striking external characters of this species consist in its large tail, which is ringed with black and white; the crispness of the fur and the seminaked condition of the under parts of the body, the sides of the face, muzzle, throat, and the inner side of the limbs:—all these parts are so sparingly clothed with hairs that the skin is visible. On the upper parts of the body there is scarcely any trace of the finer under-fur, nearly all the hairs being of the same harsh character; they are black, broadly annulated with yellowish white or rusty yellow; on the fore parts of the body the former tint prevails, but the hinder parts may be described as black, freely pencilled with bright rusty yellow; on the hind limbs this last-mentioned colour prevails, as well as on the upper side of the tarsus. The small adpressed hairs on the sides of the face are partly black and partly yellowish white; on the chest the hairs are for the most part whitish, and on the inner side of the limbs rusty yellow; on the belly the hairs are most of them yellowish white, annulated with black. The tail is very long and bushy: measuring to the end of the hair, it exceeds the head and body in length; excepting quite at the base,

where the tail is coloured like the body, all the hairs are black, broadly annulated with white, and the white on the upper surface forms bars or rings; these however become indistinct towards the apex. The ears are of moderate size and rounded. The heel is rather sparingly clothed with hair.

The skull of this animal is remarkable for its oblong-ovate form, and for having the ant-orbital foramen further back than usual; it opens indeed directly into the anterior root of the zygomatic arch, and is not in the form of a longish canal, such as we observe in other Squirrels. The nasal portion of the skull is short and broad, and the nasal bones correspond; the elongated form of the cranium is due to the greatly produced hinder portion: the antero-posterior extent of the extremely oblique bony plate forming the anterior root of the zygomatic arch is great: the post-orbital process is well-developed: the palate terminates very nearly in a line with the hinder part of the posterior molars. The incisive foramina are moderate. The auditory bullæ are rather small. The incisors are strong and very deep from front to back. The molars are small in proportion to the skull. The dimensions of the skull are,

	in.	lin.
Total length	2	10
Greatest width	1	$6\frac{1}{2}$
Width between orbits	0	$10\frac{1}{2}$
Length from post-orbital process to occiput	1	4
——— of palate	1	2
——— from front of the incisors to the first molar	0	11
Longitudinal extent of the four molars	0	6
Length of nasal bones	0	$8\frac{3}{4}$

Sciurus rufo-brachiatus. *Sc. pilis mediocritèr longis, subrigidis, nigro et flavescenti-penicillatis; corpore subtùs sordidè flavo vel rufescenti-flavo; artubus infrà rufis; caudâ longâ, non valdè floccosâ, annulis nigris et albis, vel flavescenti-albis, ornatâ, ad basin plerumque rufescente; auribus parvulis; dentibus incisoribus longitudinaliter subsulcatis.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin	8	6
——— *caudæ*	10	6
——— *tarsi digitorumque*	2	$1\frac{1}{2}$
——— *auris*	0	$4\frac{1}{2}$

Hab. in Insulâ Fernando Po.

This species approaches very nearly to the *Sciurus annulatus* of authors, but is distinguishable by its richer colouring. The general tint of *S. annulatus* might be described as yellowish grey, whilst that of the present animal is rusty grey; and especially by the bright rust-like tint of the under side of the limbs, and the pale rust or rusty white colour of the belly. The heel is clothed with hair.

The dimensions above given being from a skin, can only be regarded as an approximation; judging from the skull, the present species must be much larger than the *Sc. annulatus*. Its form is nearly the same, but the nasal portion is narrower and more elon-

gated, and the post-orbital processes are considerably larger in proportion. The dimensions of the skull are as follows:—

	in.	lin.
Total length	2	$1\frac{1}{2}$
Greatest width	1	$2\frac{1}{2}$
Width between orbits	0	$8\frac{2}{3}$
Length from the front of the incisors to the first molar	0	$7\frac{1}{4}$
Length of palate	0	$10\frac{1}{2}$
Longitudinal extent of the four molars	0	5
Length of nasal bones	0	$8\frac{1}{3}$

SCIURUS ERYTHROGENYS. *Sc. suprà rufescenti-fuscus, pilis nigro et rufescenti-penicillatis; genis rufis; gulâ, corpore subtùs, et artubus internè albis; caudâ quàm corpus breviore, nigrâ, albo-penicillatâ, pilis ad basin rufescentibus; auribus parvulis.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin	8	6
——— *caudæ*	6	3
——— *tarsi digitorumque*	1	$10\frac{1}{2}$
——— *auris*	0	4

Hab. in Insulâ Fernando Po.

The bright rust-coloured cheeks, combined with the pure white colour of the under parts of the body and inner side of the limbs, will serve to distinguish this species. The fur is rather short and moderately soft, and on the upper parts of the body the hairs are black (inclining to greyish at the base) and broadly annulated with rich rusty yellow at or near the point. A shortish longitudinal pale mark is observable on each side of the body near the shoulders. The feet are finely pencilled with black and yellowish white. The tail is rather short and not very bushy, above black and rather sparingly pencilled with white; upon separating the hairs, however, they are found to be of a pale rust-colour near the base, and along the mesial portion of the under side the tail is of a bright rusty red colour. The tarsus is naked nearly to the heel, but on the heel are a few hairs.

Mr. Fraser's collection also contained a perfect skin of the *Antilope Ogilbii*, an animal originally described from an imperfect specimen by Mr. Waterhouse in the Society's Proceedings for May 1838, p. 60.

This animal belongs to the same division as the *A. sylvicultrix* of authors, and is apparently equal to that animal in size. As in the species just mentioned, the muzzle is naked, and the horns are placed far behind the eye; they are short, straight (or nearly so) and pointed. Mr. Fraser's notes state that the animal is provided with a gland between the hoofs, and that the female has four teats.

The fur is short, glossy and adpressed, and of a bright rusty red colour, darkish on the back, and paler on the under parts of the body; a black mark runs along the back very nearly to the tail; this mark is broadest towards the shoulders, where its width is about an inch or rather less; over the shoulders it becomes obliterated, blending gradually into the brownish hue which covers those parts and

the neck. The upper surface of the head is of a deep rusty red colour, shading into black at the tip of the muzzle; the sides of the face are yellowish fawn-colour, and the throat is whitish. The ears are of moderate size, broad and somewhat pointed; externally they are clothed with closely adpressed small hairs, which are for the most part of a black colour, but in front at the base they assume a bright rust tint; this is also the colour of the fringe of longish hairs on the anterior margin. About half-way down the fore leg and on the anterior surface some black hairs are observable, intermixed with those of the ordinary colour; these become more numerous lower down and form a mark which becomes gradually broader, and from the front to the hoof it encircles the foot; numerous white hairs are intermixed on this part, and they form a white ring next to the hoof. The hind feet are coloured in the same way.

Mr. Waterhouse then read his description of a species of Cat procured at Sierra Leone.

FELIS RUTILUS. *F. pilis brevibus adpressis; corpore suprà ferrugineo, ad latera indistinctè maculato, maculis parvulis, subtùs albido maculis rufo-nigricantibus ornato; caudâ brevi, immaculatâ, suprà obscurè rufâ, subtùs pallidiore.*

	unc.	lin.
Longitudo corporis circiter	36	0
——— *caudæ*	10	0

The skin which furnishes the above characters was procured by Mr. Fraser when at Sierra Leone, and was said to be from the Mandingo country. Unfortunately, like all other skins brought from the interior for sale or barter, it is imperfect, wanting the head and lower part of the limbs. In the shortness of its tail and in its nearly uniform colouring, it approaches the Lynxes. It probably inhabits the mountains.

Imperfect skins of the *Cercopithecus Campbelli* were also procured by Mr. Fraser at the same time; they were likewise said to be from the Mandingo country.

October 11.—R. H. Solly, Esq., in the Chair.

Mr. Gould exhibited and characterized the following thirty new species of Australian Birds:—

HIRUNDO NEOXENA. *Hir. fronte, mento, gulâ, et pectore ferrugineo-rubris; rectricum caudæ (rectricibus duabus intermediis exceptis), pogonio interno obliquè albo notato; corpore suprà metallicè cæruleo, subtùs pallidè fuscescente.*

Forehead, chin, throat and chest rust-red; head, back of the neck, back, scapularies, wing-coverts, rump and upper tail-coverts deep steel-blue; wings and tail blackish brown; all but the two centre feathers of the latter with an oblique mark of white on the inner web; under surface very pale brown; under tail-coverts pale brown, passing into an irregular crescent-shaped mark near the extremity, and tipped with white; irides dark brown; bill and legs black.

Total length, 6 inches; bill, $\frac{1}{2}$; wing, $4\frac{5}{8}$; tail, 3; tarsi, $\frac{1}{2}$.

Hab. The whole of the southern coast of Australia and Van Diemen's Land.

Messrs. Vigors and Horsfield considered this species to be identical with the bird figured by Sparmann in the 'Museum Carlsonianum' under the name of *Hirundo Javanica,* which is there represented with a square tail, and which, if drawn correctly, is not only specifically but generically distinct. Those gentlemen likewise considered it to be identical with the *Hirondelle Orientale* of M. Temminck's 'Planches Coloriées,' but from which also I conceive it to be distinct. On the contrary, the swallow figured in Griffith's edition of Cuvier's 'Animal Kingdom' is certainly the Australian bird; but as the specific term there given had been previously employed by Sparmann, as mentioned above, the necessity of a new name for the present bird has been forced upon me; and that of *neoxena* has suggested itself as appropriate, from the circumstance of its appearance throughout the whole of the southern portions of Australia being hailed as a welcome indication of the approach of spring, and its arrival there associated with precisely the same ideas as those popularly entertained respecting our own pretty swallow in Europe. The two species are in fact beautiful representatives of each other, and assimilate not only in their migratory movements, but also most closely in their whole habits, actions and economy.

Collocalia Ariel. *Coll. vertice ferrugineo-rubro, dorso, plumis scapularibus, et alarum tectricibus saturatè metallico-cæruleis, uropygio fulvescenti-albo, tectricibus caudæ fuscis; corpore subtùs albo, ferrugineo tincto.*

Crown of the head rust-red; back, scapularies and wing-coverts deep steel-blue; wings and tail dark brown; rump buffy white; upper tail-coverts brown; under surface white, tinged with rust-red, particularly on the sides of the neck and flanks; the feathers of the throat with a fine line of dark brown down the centre; irides blackish brown; bill blackish grey; legs and feet olive-grey.

Total length, 4 inches; bill, $\frac{3}{8}$; wing, $3\frac{3}{4}$; tail, $1\frac{7}{8}$; tarsi, $\frac{1}{2}$.

Hab. The southern portions of Australia.

Dicrurus bracteatus. *Dic. corpore suprà et infrà saturatè nigro; plumis capitis lunulâ metallico-viridi, illis corporis præsertìm pectoris guttâ ejusdem splendoris, ad apicem bracteatis.*

Head, body above and below deep black; the feathers of the head with a crescent, and the feathers of the body, particularly of the breast, with a spot of deep metallic green at the tip; wings and tail deep glossy green; under wing-coverts black, tipped with white; irides brownish red; bill and feet blackish brown.

Total length, $10\frac{1}{2}$ inches; bill, $1\frac{3}{8}$; wing, 6; tail, $5\frac{1}{2}$; tarsi, $\frac{7}{8}$.

Hab. The eastern and northern coasts of Australia.

Syn. Dicrurus balicassius, *Vig. & Horsf.*, but not of *Lath.*

Rhipidura dryas, Gould. *Rhipi. fronte, dorso inferiore, tectricibusque caudæ ferrugineis; caudâ fuscescenti-cinereâ, rectricibus duabus intermediis ad apicem obscurè albo notatis, reliquis per partem apicalem tertiam albis.*

Forehead rust-red; crown of the head, back of the neck, upper part of the back and the wings olive-brown; lower part of the back and upper tail-coverts rust-red; tail brownish grey, the two centre feathers obscurely tipped with white, and the remainder white for one-third of their length from the tip; throat white; ear-coverts dark brown; chest black, the feathers being edged with white as they pass on to the abdomen, which is wholly white; flanks and under tail-coverts very faintly tinged with buff; irides blackish brown; bill black; feet dark brown.

Total length, $5\frac{7}{8}$ inches; bill, $\frac{5}{8}$; wing, $2\frac{5}{8}$; tail, $3\frac{3}{4}$; tarsi, $\frac{3}{4}$.

This species is nearly allied to *Rhipidura rufifrons*, but differs in being much smaller, in the red not extending on to the plumes and shafts of the tail-feathers, and in there being more white on their extremities.

Hab. Port Essington, north coast of Australia.

Micræca flavigaster. *Mic. corpore superiore fuscescenti-olivaceo; alis caudâque fuscis, colore pallidiore plumis marginatis; gulâ albâ, corpore inferiore flavo.*

All the upper surface brownish olive; wings and tail brown, margined with paler brown; throat white; all the under surface yellow; irides dark brown; bill blackish brown; feet blackish grey.

Total length, $3\frac{5}{8}$ inches; bill, $\frac{5}{8}$; wing, $2\frac{7}{8}$; tail, $2\frac{1}{4}$; tarsi, $\frac{1}{2}$.

Hab. Port Essington.

Gerygone* magnirostris. *Ger. corpore suprà fusco, infrà albo; primariis levitèr olivaceo-marginatis; caudâ propè apicem indistinctè fuscescenti-nigro vittatâ.*

All the upper surface brown; margins of the primaries slightly tinged with olive; tail-feathers crossed near the extremity by an indistinct broad band of brownish black; all the under surface white, tinged with brownish buff; irides light brown; bill olive-brown; the base of the lower mandible pearl-white; feet greenish grey.

Total length, $3\frac{3}{4}$ inches; bill, $\frac{9}{16}$; wing, $2\frac{1}{4}$; tail, $1\frac{7}{8}$; tarsi, $\frac{5}{8}$.

Hab. Port Essington.

Gerygone chloronotus. *Ger. capite et nuchâ fuscescenti-cinereis; dorso, alarum tectricibus, uropygio, tectricibus caudæ, remigum primorum marginibus, et per partem dimidiam basalem marginibus caudæ rectricum nitidè olivaceo-viridibus; corpore subtùs, lateribus, crissoque olivaceo-flavis.*

Head and back of the neck brownish grey; back, wing-coverts, rump, upper tail-coverts, margins of the primaries, and the margins of the basal half of the tail-feathers, bright olive-green; primaries and tail-feathers brown, the latter becoming much darker towards the extremity; under surface white; sides and vent olive-yellow; irides wood-brown; upper mandible greenish grey; lower mandible white; feet blackish grey.

* *Psilopus* of the former parts of these 'Proceedings,' and for which the term *Gerygone* is now substituted, the former term having been previously employed.

Total length, $3\frac{1}{2}$ inches; bill, $\frac{9}{16}$; wing, $2\frac{1}{8}$; tail, $1\frac{3}{8}$; tarsi, $\frac{5}{8}$.
Hab. Port Essington.

GERYGONE LEVIGASTER. *Ger. corpore superiore ferrugineo-fusco; inferiore albo, leviter flavido tincto.*

A narrow obscure line, commencing at the nostrils and passing over the eye, yellowish white; all the upper surface rusty brown; primaries brown, margined with lighter brown; tail whitish at the base, gradually deepening into nearly black, the lateral feather largely, and the remainder, except the two middle ones, slightly tipped with white; all the under surface white, slightly washed with yellow; irides light reddish brown; bill olive-brown; base of lower mandible light ash-grey; feet dark greenish grey.

Total length, $3\frac{3}{8}$ inches; bill, $\frac{1}{2}$; wing, 2; tail, $1\frac{1}{2}$; tarsi, $\frac{3}{4}$.
Hab. Port Essington.

For a new form, nearly allied to *Gerygone*, Mr. Gould proposed the generic name of *Smicrornis*, with the following characters:—

Gen. Char.—*Rostrum* parvulum, et instar grani tritici; ferè cylindraceum; a basi incurvatum. *Nares* basales oblongæ, et operculo obtectæ; ad basin rostri, pili tenuissimi admodum pauci. *Alæ* modicè longæ, alula brevissima, primariæ tertia, quarta, et quinta longissimæ, et inter se ferè æquales. *Cauda* brevis, et quadrata. *Tarsi* modici; digiti perbreves; digitus posticus cum intermedio ferè coæqualis. *Ungues* admodum adunci, et ad hærendum aptati.

SMICRORNIS FLAVESCENS. *Smic. corpore superiore nitidè flavescenti-olivaceo, plumis capitis strigâ fuscâ ferè obsoletâ longitudinaliter notatis, corpore inferiore nitidè flavo.*

All the upper surface bright yellowish olive; the feathers of the head with an indistinct line of brown down the centre; wings brown; tail brown, deepening into black near the extremity, and with a large oval spot of white on the inner web, near the tip of all but the two central feathers; all the under surface bright yellow.

Total length, $2\frac{3}{4}$ inches; bill, $\frac{5}{16}$; wing, $1\frac{7}{8}$; tail, $1\frac{1}{4}$; tarsi, $\frac{9}{16}$.
Hab. Port Essington.

PACHYCEPHALA FALCATA, Gould. *Pach. vertice, loris, plumis auricularibus, dorso, caudæque tectricibus cinereis; gulâ albâ, lunulâ nigrâ infrà circumdatâ.*

Adult male.—Crown of the head, lores, ear-coverts, back and upper tail-coverts grey; wings dark brown, all the feathers margined with grey; throat white, bounded below by a distinct crescent of black; abdomen, flanks, and under tail-coverts orange-brown; tail dark brown; the basal portion of the webs edged with grey; irides reddish brown; bill black; feet blackish brown.

Total length, $5\frac{3}{4}$ inches; bill, $\frac{3}{4}$; wing, $3\frac{1}{2}$; tail, $2\frac{7}{8}$; tarsi, $\frac{3}{4}$.

Adult female.—Crown of the head and all the upper surface grey; ear-coverts brownish grey; throat buffy white, passing into light buff or fawn-colour on the chest, flanks, abdomen, and under tail-coverts; the feathers of the throat and chest with a narrow dark line down the centre; wings and tail as in the male.

Total length, $5\frac{1}{2}$ inches; bill, $\frac{5}{8}$; wing, $3\frac{1}{2}$; tail, $2\frac{3}{4}$; tarsi, $\frac{3}{4}$.

Young male.—Similar in colour to the female, but with the throat whiter and the markings on the chest much more distinct, and extending over the abdomen also.

Nearly allied to *Pachycephala pectoralis*, but differs in being rather smaller, and in having no black round the eyes or on the ear-coverts.

Hab. Port Essington.

Pachycephala melanura. *Pach. capite, lunulá pone oculos, per latera colli ductá et pectus transeunte, caudâque nigris; gulâ albá, torque nuchali, corporeque subtùs, saturatè flavis.*

Head, crescent commencing behind the eye and crossing the chest, and the tail black; throat pure white; collar round the back and sides of the neck, and all the under surface very rich gamboge-yellow; upper surface rich yellowish olive; wings black; the coverts margined with yellowish olive; the primaries narrowly and the secondaries broadly margined with yellowish grey; bill and feet black; irides brown.

Total length, 6 inches; bill, $\frac{7}{8}$; wing, $3\frac{1}{4}$; tail, $2\frac{1}{2}$; tarsi, $\frac{7}{8}$.

Hab. North coast of Australia.

Pachycephala simplex. *Pach. corpore superiore fusco, inferiore fuscescenti-albo, singulis plumis strigá fuscá ferè obsoletá longitudinaliter notatis.*

All the upper surface brown; all the under surface brownish white, with a very faint stripe of brown down the centre of each feather; irides light brown; bill and feet black.

Total length, 5 inches; bill, $\frac{3}{4}$; wing, $2\frac{7}{8}$; tail, $2\frac{3}{8}$; tarsi, $\frac{5}{8}$.

Hab. Port Essington.

Mr. Gould then mentioned, that having obtained another species of the same form as the *Acanthiza pyrrhopygia* of Messrs. Vigors and Horsfield, which latter differs considerably from the other members of that group, he proposed to form the two birds into a new genus, under the name of *Hylacola,* with the following characters:—

Genus Hylacola.

Gen. Char.—*Rostrum* capite brevius, compressum, ad basin æquè altum atque latum; culmen gradatìm ad apicem mandibulæ superioris declive; apex levitèr emarginatus; rictus vibrissis raris instructus. *Nares* basales, oblongæ, magis grandes, et operculo tectæ. *Alæ* breves, admodùm rotundatæ concavæ; primariæ prima, secunda et tertia, longitudine dissimili, quarta, quinta, et sexta coæquales, et longissimæ. *Cauda* magis elongata, et rotundata. *Tarsi* mediocres. *Digiti* magis elongati; externi coæquales.

Typus, *Acanthiza pyrrhopygia,* Vig. and Horsf.

Hylacola cauta. *Hyl. lineá albá per faciem super oculos ductá vertice, corporeque superiore fuscis; caudæ tectricibus crissoque pallidè castaneis; alarum tectricibus fuscis, fuscescenti-albo marginatis, primariis fuscis, pogoniis externis ad basin conspicuè albis.*

At the base of the upper mandible a line of white, which con-

tinues along the side of the face and over the eye; above this a narrow line of black; crown of the head and all the upper surface brown; upper and under tail-coverts bright chestnut; wing-coverts brown, edged with brownish white; primaries brown, with the outer web at the base white, forming a conspicuous spot in the centre of the wing; tail blackish brown, tipped with white; throat striated with black and white, produced by each feather being fringed with white, and having a strong stripe of black down the centre; flanks mottled brown and white; abdomen white; bill dark brown; irides buff-white; feet flesh-brown.

Total length, $5\frac{3}{4}$ inches; bill, $\frac{9}{16}$; wing, $2\frac{1}{8}$; tail, $2\frac{1}{2}$; tarsi, $\frac{7}{8}$.

Hab. Western Belts of the Murray in South Australia.

Cincloramphus cantatoris. *Cinc. corpore superiore arenaceo-fusco, colore plumarum centrali saturatiore, notâ antè oculos triangulari fuscescenti-nigrâ; gulâ et pectore sordidè albis, hujus plumis strigâ fuscâ longitudinaliter notatis, corpore inferiore pallidè fusco, abdomine medio saturatè fusco.*

All the upper surface sandy brown, the centres of the feathers darker; primaries and tail greyish brown, slightly margined with reddish brown; immediately before the eye a triangular spot of brownish black; throat and chest dull white, the latter with a stripe of brown down each feather; under surface light brown; in the centre of the abdomen a patch of dark brown, each feather margined with pale brown; bill and feet fleshy brown.

Total length, 8 inches; bill, $1\frac{1}{8}$; wing, $4\frac{1}{8}$; tail, $4\frac{1}{8}$; tarsi, $1\frac{1}{2}$.

Hab. South Australia.

Ptilotis flava. *Ptil. corpore superiore, alis, caudâque olivaceo-flavis; corpore inferiore lucidè ejusdem coloris.*

All the upper surface, wings and tail olive-yellow; inner webs of the primaries brown; all the under surface bright olive-yellow; bill blackish brown; feet reddish flesh-brown.

Total length, $6\frac{1}{4}$ inches; bill, $\frac{7}{8}$; wing, $3\frac{1}{4}$; tail, $3\frac{1}{4}$; tarsi, $\frac{3}{4}$.

Hab. North coast of Australia.

Ptilotis versicolor. *Ptil. corpore superiore fuscescenti-olivaceo, plumis flavescenti-olivaceo marginatis, alis caudâque subtùs luteolis; strigâ superoculari nigrâ; plumis auricularibus saturatè cinereis; strigâ infra-auriculari nitidè flavâ, gulâ et corpore subtùs flavis, singulis plumis strigâ fuscâ longitudinalitèr notatis; crisso pallidiore.*

All the upper surface brownish olive, tinged with yellowish olive on the margins of the feathers; outer webs of the primaries and tail wax-yellow; inner webs brown; under surface of the wing and tail yellowish buff; stripe over the eye to the back of the neck black; ear-coverts dark grey; below the ear-coverts a stripe of bright yellow; throat and under surface yellow, becoming paler as it approaches the vent, each feather with a stripe of brown down the centre.

Total length, 8 inches; bill, 1; wing, 4; tail, $3\frac{3}{4}$; tarsi, 1.

Hab. North coast of Australia.

Ptilotis unicolor. *Ptil. loris et orbitis saturatè fuscis; colore*

corporis fuscescenti-olivaceo, apud partes inferiores pallidiore; primariis clariore marginatis; humeris internis luteolis.

Lores and orbits deep brown; all the plumage brownish olive; the under surface paler than the upper; primaries margined with brighter olive than the other parts of the body; under surface of the shoulder pale buff; irides obscure red; bill dark olive-brown; naked gape fleshy white, passing into yellow at the corner of the mouth; legs and feet light ash-grey.

Male.—Total length, 7 inches; bill, 1; wing, $3\frac{3}{4}$; tail, $3\frac{1}{4}$; tarsi, 1.

Hab. Port Essington.

The sexes are alike in colour, but the female is considerably smaller in size.

MYZOMELA OBSCURA. *Myz. colore corporis sordidè fusco, apud partes inferiores pallidiore, et ad caput tincturâ vinaceâ.*

The whole of the plumage dull brown, with a vinous tinge on the head; paler on the under surface; irides bright red; bill dark greenish black; feet dark bluish grey; tarsi tinged with yellow.

Male.—Total length, 5 inches; bill, $\frac{3}{4}$; wing, $2\frac{3}{4}$; tail, $2\frac{1}{4}$; tarsi, $\frac{5}{8}$.

Hab. Port Essington.

The sexes differ only in the female being much smaller in size.

GLYCIPHILA FASCIATA. *Glyc. vertice fuscescenti-nigro, plumis ad apicem lunulâ parvulâ albâ ornatis; uropygio rufo tincto, faciei lateribus, gulâ et corpore subtùs albis, ab angulis oris strigâ angustâ fuscescenti-nigrâ per latera colli ductâ; pectore lineis semicircularibus fuscescenti-nigris transversìm fasciato-lateribus et crisso luteolis, laterum plumis strigâ centrali fuscescenti-nigrâ longitudinalitèr notatis.*

Crown of the head brownish black, with a small crescent of white at the extremity of each feather; feathers of the back very dark brown, margined with buffy brown; rump tinged with rufous; wings and tail dark brown, fringed with light brown; sides of the face, throat, and under surface white; from the angle of the mouth down the side of the neck a narrow stripe of brownish black; chest crossed by a number of semicircular brownish black fasciæ; flanks and under tail-coverts buff, the former with a stripe of brownish black down the centre; irides reddish brown; bill greenish grey; feet aurora-red.

Total length, $4\frac{3}{4}$ inches; bill, $\frac{5}{8}$; wing, $2\frac{7}{8}$; tail, $2\frac{1}{8}$; tarsi, $\frac{5}{8}$.

Hab. Port Essington.

ENTOMOPHILA? RUFOGULARIS. *Ent. capite et corpore superiore fuscis; primariis et caudæ rectricibus, externè colore cerino marginatis, gulâ ferrugineâ.*

Head and all the upper surface brown; wings and tail darker brown; primaries, secondaries and tail-feathers margined externally with wax-yellow; throat rust-red; sides of the head and all the under surface very pale brown; bill and feet dark purplish brown.

Total length, $4\frac{3}{4}$ inches; bill, $\frac{1}{2}$; wing, $2\frac{3}{4}$; tail, $2\frac{1}{8}$; tarsi, $\frac{5}{8}$.

Hab. North coast of Australia.

ENTOMOPHILA? ALBOGULARIS. *Ent. capite saturatè cinereo, corpore superiore fusco; alis caudâque saturatioribus; primariis,*

secundariis, rectricibusque caudæ per partem basalem dimidiam cerino marginatis; gulâ albâ, pectore et lateribus e rubro-luteolis; abdomine medio, et crisso albis.

Head dark grey; all the upper surface brown; wings and tail darker brown; primaries, secondaries, and basal half of the tail-feathers margined with wax-yellow; throat pure white; chest and flanks reddish buff; centre of the abdomen and under tail-coverts white; irides bright reddish brown; bill blackish grey; feet bluish grey.

Total length, $4\frac{1}{2}$ inches; bill, $\frac{5}{8}$; wing, $2\frac{5}{8}$; tail, 2; tarsi, $\frac{3}{4}$.

The female is similar, but much less brilliant in colour than her mate.

Hab. Port Essington.

Calyptorhynchus macrorhynchus. *Cal. mas fulgidè e cæruleo-niger, rectricibus caudæ tribus externis (externæ pogonio externo excepto) ferè apud medium vittâ latâ pulchrè coccineâ fasciatis.*

Fœm. a mari differt plumis cristæ, laterum capitis, tectricumque alarum flavido-guttatis, singulis plumis corporis inferioris, et præsertìm pectoris fasciis nonnullis luteolis ornatis; rectricibus caudæ tribus externis subtùs, crebrè et irregularitèr flavido-fasciatis; suprà ad basin fasciis nitidè flavis ad basin, exinde ad apicem pallidè coccineis notatis.

Male.—The whole of the plumage glossy bluish black; lateral tail-feathers, except the external web of the outer one, crossed by a broad band of fine scarlet; bill horn-colour; irides blackish brown; feet mealy blackish brown.

Female.—General plumage as in the male, but with the crest-feathers, those on the sides of the face and neck, and the wing-coverts, spotted with light yellow; each feather of the under surface, but particularly the chest, crossed by several semicircular fasciæ of yellowish buff; lateral tail-feathers crossed on the under surface by numerous irregular bands of dull yellow, which are broad and freckled with black at the base of the tail, and become narrower and more irregular as they approach the tip; on the upper surface of the tail these bands are bright yellow at the base of the feathers, and gradually change into pale scarlet as they approach the tip; irides blackish brown.

Total length, 2 inches; bill, $1\frac{1}{2}$ in length and 3 in depth; wing, 16; tail, 12; tarsi, 1.

Hab. Port Essington.

Cacatua sanguinea. *Cac. corpore albo, plumis faciei, ad basin sanguineo-tinctis; primariis, secundariis et rectricibus caudæ, cum pogoniis internis ad basin sulphureis.*

All the plumage white; base of the feathers of the lores and sides of the face stained with patches of blood-red; base of the inner webs of the primaries, secondaries and tail-feathers fine sulphur-yellow; bill yellowish white; feet mealy brown.

Total length, 15 inches; bill, $1\frac{1}{8}$; wing, $10\frac{3}{8}$; tail, 6; tarsi, $\frac{7}{8}$.

Hab. North coast of Australia.

Climacteris melanura, Gould. *Clim. fronte, corpore superiore, rectricibusque caudæ ex holoserico fuscescenti-nigris; occipite et nuchâ ferrugineo-tinctis; primariis et secundariis ad apicem et basin saturatè fuscis; plumis gularibus albis nigro-marginatis; abdomine et lateribus ferrugineis; crisso nigro.*

Forehead, all the upper surface and tail-feathers velvety brownish black; the occiput and back of the neck stained with ferruginous brown; primaries and secondaries dark brown at the base and at the tip; the intermediate space buff, forming a conspicuous band across the wing when expanded; feathers of the throat white, edged all round with black, giving the throat a striated appearance; abdomen and flanks ferruginous brown; under tail-coverts black, irregularly crossed with bars of buff; bill and feet blackish brown.

Total length, $6\frac{3}{4}$ inches; bill, $\frac{7}{8}$; wing, 4; tail, 3; tarsi, 1.

In size this species rather exceeds the *Climacteris scandens*.

Hab. The north-west coast of Australia.

From the collection of Mr. Bynoe.

Porzana fluminea. *Porz. corpore superiore olivaceo; singulis plumis strigâ centrali nigrescente, et ad marginem guttis duabus albis anticè et posticè nigro-cinctis, ornatis; facie, gulâ, pectore et abdomine superiore plumbeo-cinereis, abdomine imo, et lateribus cinerescenti-nigris, lineis albis angustis irregularitèr fasciatis.*

All the upper surface olive, with a broad stripe of blackish brown down the centre and two oval spots of white, bounded above and below with black on the margin of each web of every feather; primaries and secondaries brown; tail dark brown, margined with lighter brown and with an indication of white spots on the extreme edge; face, throat, chest, and upper part of the abdomen dark slate-grey; lower part of the abdomen and flanks greyish black, crossed by narrow irregular bars of white; under tail-coverts white; bill orange-red at the base, and dark olive-green for the remainder of its length; feet dark olive-green.

Total length, 7 inches; bill, $\frac{7}{8}$; wing, $3\frac{3}{4}$; tail, $1\frac{3}{4}$; tarsi, 1.

Hab. New South Wales.

Porzana palustris. *Porz. capite et nuchâ ferrugineo-fuscis, singulis plumis longitudinalitèr strigâ centrali nigrescenti-ornatis; plumis dorsalibus scapularibus, et secundariis fuscescenti-nigris, rufescente marginatis, et strigâ oblongâ albâ nigro interruptâ ornatis; gulâ, pectore, et abdomine superiore cinereis; abdomine imo et lateribus nigrescentibus lineis latis irregularibus cinereis fasciatis.*

Head and back of the neck rusty brown, with a stripe of blackish brown down the centre of each feather; feathers of the back, scapularies and secondaries brownish black margined with rusty brown, and with an oblong stripe or mark of white, interrupted in the middle with black; wing-coverts rusty brown, a few of them marked on their inner webs like the scapularies; primaries brown, two or three of the innermost with a mark or marks of white at the tip; tail dark brown, fringed with rusty brown; face, throat, chest and upper part

of the abdomen grey; lower part of the abdomen and flanks blackish grey, crossed by broad irregular bands of grey; bill and feet olive-brown.

Total length, 6 inches; bill, $\frac{3}{4}$; wing, 3; tail, $1\frac{1}{2}$; tarsi, 1.

Hab. Van Diemen's Land.

STERNA VELOX. *Stern. fronte, loris, colli lateribus, et corpore inferiore albis; spatio circumoculari, occipite et nuchâ nigris; corpore superiore, alis, caudâque bellè cinereis.*

Forehead, lores, sides of the neck, and all the under surface white; space surrounding the eye, occiput, and back of the neck black; all the upper surface, wings and tail delicate grey; outer web of the external quill greyish black; shafts of all the primaries white; irides blackish brown; bill black.

Total length, 13 inches; bill, $2\frac{1}{8}$; wing, $9\frac{3}{4}$; tail, $6\frac{1}{4}$; tarsi, $\frac{3}{4}$.

Hab. Bass's Straits.

HYDROCHELIDON FLUVIATILIS. *Hyd. fronte, vertice, et nuchâ nigris; corpore superiore, alis caudâque pallidè cinereis; facie et gulâ albis, hôc colore gradatìm ad pectus cinerescente, et hôc ad abdomen necnon ad latera nigrescente.*

Forehead, crown and nape deep black; all the upper surface, wings and tail light grey; sides of the face and the throat white, gradually deepening into grey on the chest, and the grey into black on the abdomen and flanks; under surface of the shoulder and under tail-coverts white; irides black; bill blood-red; feet light blood-red.

Total length, $9\frac{3}{4}$ inches; bill, $1\frac{5}{8}$; wing, $8\frac{3}{4}$; tail, $3\frac{1}{4}$; tarsi, $\frac{7}{8}$.

Hab. Rivers and lakes of the interior of New South Wales.

THALASSEUS TORRESII. *Thal. fronte, facie, et collo dorso superiore, partibusque inferioribus lucidè albis; plumis verticis et illis oculos circumdantibus albis, guttâ parvulâ centrali nigrâ notatis; occipite et nuchâ nigerrimis; dorso alisque saturatè cinereis, caudâ pallidè cinereâ.*

Forehead, sides of the face and neck, upper part of the back and all the under surface silky white; feathers of the crown and surrounding the eye white, with a minute spot of black in the centre of each; occiput and back of the neck black; back and wings deep grey; tail grey; primaries greyish black, broadly margined on their inner web with white; the shafts white; irides dark brown; bill ochre-yellow; feet blackish grey.

Total length, $13\frac{1}{2}$ inches; bill, $2\frac{3}{4}$; wing, $11\frac{1}{2}$; tail, $4\frac{3}{4}$; tarsi, 1.

Hab. Port Essington.

Nearly allied to *S. poliocerca*, but much smaller in size.

STERNULA NEREIS. *Stern. vertice et nuchâ nigris, hôc colore oculos cingente maculamque anteriorem efficiente, ut non in frontem ducto; fronte albo; dorso alisque bellè ex argenteo-cinereis; corpore inferiore, uropygio et caudâ albis.*

Crown of the head and back of the neck black, which colour extends round the eye, and is continued in the form of a spot before that organ; but this colour does not extend on to the forehead, which is white; back and wings delicate silvery grey; the outer web of the

external primary dark grey at the base, gradually passing into grey towards the tip; all the under surface, rump and tail pure white; irides black; bill, tongue and feet rich orange-yellow.

Total length, $10\frac{1}{2}$ inches; bill, $1\frac{3}{4}$; wing, $7\frac{1}{2}$; tail, $4\frac{1}{4}$; tarsi, $\frac{9}{16}$.

Hab. Bass's Straits.

BOTANICAL SOCIETY OF LONDON.

May 19, 1843.—J. E. Gray, Esq., F.R.S. &c., President, in the Chair.

Mr. A. Henfrey, A.L.S., exhibited specimens of *Leucojum æstivum*, collected in Greenwich Marshes. He also presented specimens of *Dentaria bulbifera*, collected at Harefield, Middlesex.

Mr. W. Andrews presented specimens of varieties of *Saxifraga Geum*, in one of which the nectaries thickly surrounded the ovary. The specimens were collected at the Great Blasquest Island, coast of Kerry, Ireland.

Read, "Notice of the discovery of two species of Fungi new to the British Flora," by Dr. Philip, Buenos Ayres: *Peziza corticalis*, found on woodbine between Stokenchurch, Oxfordshire, and Cadmore End; *Hystericum rubrum*, found on bean-stalks at Aston Rowant and Tetsworth, Oxfordshire.

Read also the commencement of a paper by Mr. Edwin Lees, F.L.S., "On the Groups into which the British Fruticose *Rubi* are divisible." The paper was accompanied by drawings and specimens.

June 2.—John Reynolds, Esq., Treasurer, in the Chair.

Mrs. M. Stovin presented specimens of *Anemone ranunculoides*, found *wild* in a wood near Worksop, Nottinghamshire.

Mr. F. Bainbridge presented a specimen of *Lecidea Wahlenbergii* (Acharius), a lichen new to the British flora, discovered by him on Ben Nevis, Inverness-shire, in July last.

The continuation of the paper (commenced at the last Meeting), "On the Groups into which the British Fruticose *Rubi* are divisible," by Mr. Edwin Lees, F.L.S., was read.

The only European forms of the common fruticose brambles noticed by Linnæus were *R. cæsius* and *R. fruticosus*, supposed to include the rest. Sir J. E. Smith, in the 'English Botany,' distinguished *R. corylifolius* as worthy of enumeration, and Anderson, in the Transactions of the Linnæan Society, vol. xi., described the still more obvious *R. suberectus*. Meantime Weihe and Nees von Esenbeck commenced the publication of an elaborate monograph of the genus, under the title of 'Rubi Germanici.' In Smith's 'English Flora' the number of species of British *Rubi* is advanced to eleven, though two of these appear to have been misunderstood, and therefore the real number was only nine.

Before the *Rubi* can be adequately comprehended, so as to reduce them into groups, their mode of growth must be fully understood, and it will perhaps become evident what points, from their greater permanency, are to be relied upon for general as well as specific characters. The general idea of the *biennial* continuance of the

Rubi is incorrect; all are *triennial* by the renewed growth of smaller flowering branches from the barren stems or the bases of the withered panicles of the second year, or by the barren stems shooting forth a *second* crop of barren stems, which flower the *third* year; and often the existence of an individual bramble, independent of fresh shoots from the root, is protracted to the fourth or fifth year.

The consequence of this is, that no specific distinction whatever can be drawn from the inflorescence, which may be long the second year and is much shorter the third; while it often happens, that when a barren stem becomes prostrate, the panicles of flowers rising from the extreme end are twice or thrice as long as those nearest to the main shrub. This fact of the extended growth of the *Rubi* has been lost sight of, and hence puzzling productions have been considered as new species, just as *R. fastigiatus* of Weihe and Nees is but a form of *R. plicatus*, as now admitted by Esenbeck himself, from its exhibiting a smaller growth of third year's flowers.

Undoubtedly the *barren stem* offers the best, if not the only plan of discrimination in subdividing the *Rubi* into groups, especially if we take into consideration, in combination with it, the *erect* or *arched* mode of growth and continuance of vitality. The leaves are so exceedingly variable in shape, size, and hoariness, as to be almost useless in this respect. From the table accompanying the paper was seen what the differences really were by which groups can be defined, and it will appear in fact that this resolves itself almost entirely into the *perfect smoothness*, *glaucosity*, or more or less *hairiness* and glandulosity of the barren stems.

Commencing then with *R. cæsius* and ending with *R. idæus*, it will appear that *seven* groups are easily separable from each other, and passing from one into the other in a very natural manner. These, at all events, may be considered the *smallest number of species* into which our *Rubi* can be classed, without confounding really different things; while if we proceed further into minuter distinctions, these typical forms will become *groups*, under which the various varieties, species, or subspecies, of each will be referable.

1. *Cæsii.* Having the barren stem round, bloomy, covered with unequal prickles, trailing, rooting. *R. cæsius* and its various derivatives.
2. *Glandulosæ.* Barren stem angular, hairy and prickly, setose, very glandular, arched or trailing, rooting. This group will include *R. radula* of Weihe and Nees, *R. Kœhleri*, *fusco-ater*, &c.
3. *Villicaulæ.* Barren stem angular, very hairy, but without glands, prickly, arched or decumbent, rooting. Including *R. villicaulis*, Weihe and Nees; *R. leucostachys*, Smith, &c.
4. *Fruticosi.* Barren stem angular, glaucous, prickly, arching, rooting. Including *R. fruticosus* and *discolor*.
5. *Nitidi.* Barren stem angular, almost smooth, with few prickles, rooting rarely. *R. affinis*, *nitidus*, *rhamnifolius*, &c.
6. *Suberecti.* Barren stem angular, very smooth, nearly erect, not rooting. Including *R. suberectus*, Anderson and Smith; *R. plicatus*, Weihe and Nees; and *R. fissus*, Lindley.

7. *Idæi.* Barren stem round, downy, covered with innumerable small dilated prickles, erect. *R. idæus* and varieties.

There is, however, it must be admitted, an anomaly in the first group, which can only be got over by subdividing it into two (as in the tabular view), for the excessively glandulose assurgent stem of *R. dumetorum* has a very different aspect from the prostrate *bloomy* one of *R. cæsius*, and yet it is demonstrable that the former is really derivable from the latter; so that although the blue berries of the dewberry would at first sight appear so discriminative, varieties arise with fruit altogether of a different aspect. It must be borne in mind, however, that this is in a great degree in accordance with the well-known laws of cultivation. *R. dumetorum* is *cæsius* excessively developed in leaves and flowers, but the fruit is mostly abortive or imperfect; while *R. cæsius*, in its normal prostrate form, with thin foliage and small flowers, produces on the humid ground the finest and most palatable fruit of any of the fruticose brambles.

The first group of *Cæsii* must therefore necessarily be divided into *two*, but the other groups will be found to maintain the characters assigned them pretty correctly, and may therefore be depended on. It is true that occasionally some of the *Villicaulæ* will exhibit a few glands on their stems or panicles under circumstances of great luxuriance of growth or exposure, but nothing to compare with the excessive glandulosity of the *Glandulosæ*. Then it is true that the barren stem of the second group of *Cæsii* is nearly as glandular as the *Glandulosæ*, but the former will show their affinity with *cæsius* by the calyx being *involute* on the fruit, not *reflex*, as in the latter. The *Fruticosi* always preserve an independent marked character; and the *Nitidi*, if in one of their forms, *R. affinis*, coming near to the *Suberecti*, may yet be always well distinguished by the arching barren stem, which, where exposed, is very stiff and rigid in the latter, almost as much so as in *R. idæus*. This is well observable in the barren moors of North Wales. The paper was accompanied by drawings and specimens.

GEOLOGICAL SOCIETY.

February 1, 1843.—Letter from J. Hamilton Cooper, Esq., to Charles Lyell, Esq., V.P.G.S., " On Fossil bones found in digging the New Brunswick Canal in Georgia."

Mr. Cooper prefaces his communication by a description of the country surrounding the locality in which the bones were found. The portion described is that part of the sea-coast of Georgia which lies between the Alatamaha and Turtle rivers in one direction, and the Atlantic Ocean and the head of tide water on the other. For twenty miles inland the land is low, averaging a height of from ten to twenty feet, and reaching, in some instances, forty feet, and consisting of swamps, salt-marshes, sandy land, and clay loam. It then suddenly rises to the height of seventy feet, and runs back west at this elevation about twenty miles, at which point there is a similar elevation of between sixty and seventy feet. The whole of this district is a post-tertiary formation, and is composed of recent allu-

vium, and a well-characterized marine post-pliocene deposit. The recent alluvium is divided into inland-swamp, tide-swamp, and salt-marsh. The two last occupy a shallow basin having a depth of about twelve feet, the bottom and sides of which are the post-pliocene formation. This the author divides into three groups, in the last of which, constituting the elevated sand hills, no organic remains have been found; in the two former marine shells of existing species occur.

The fossil bones of the land mammalia discovered by Mr. Cooper, were found resting on the yellow sand and enveloped in the recent clay alluvium. Their unworn state and the grouping together of many bones of the same skeleton, render it highly probable that the carcasses of the animals falling or floating into a former lake or stream, sank to the sandy bottom, and were gradually covered to their present depth by the sedimentary deposits from the water. Among them were remains of the megatherium, *Mastodon giganteum*, mammoth, hippopotamus and horse. The fossil shells found in the post-pliocene, were species at present existing on the neighbouring shores.

The facts narrated by Mr. Cooper lead to the following conclusions:—1st. That the post-pliocene formation extends further south than Maryland, to which it has hitherto been limited. 2nd. The co-existence of the megatherium with the mammoth, mastodon, horse, bison, and hippopotamus. 3rd, That the surface of the country has undergone no sudden or violent change since those animals inhabited it, which is proved by the absence of all traces of diluvial action in the enveloping alluvium or surrounding country. 4th. That whatever changes of temperature may have taken place since that time, fatal to the existence of those mammalia, the identity of the fossil with the existing species of the marine shells of the coast shows that the temperature of the ocean at a period prior to the existence of the megatherium, the mastodon, and the hippopotamus was such as is congenial to the present marine testacea of Georgia.

"Description of some Fossil Fruits from the Chalk-formation of the South-east of England." By Gideon Algernon Mantell, LL.D., F.R.S., &c.

The fruits described are three in number, viz.—

1. *Zamia Sussexiensis*, Mantell.—From the greensand. A cone allied to the *Zamia macrocephala*, a greensand fossil from Kent, figured in Lindley and Hutton's 'Fossil Flora,' pl. 125, from which it differs in form and in the number, size, and shape of its scales, which are more numerous, smaller and more oblong than in the Kentish species. It is five inches long, and at the greatest circumference measures six inches. It was found about two years ago in an accumulation of fossil coniferous wood in a sand-bank at Selmeston, Sussex, at the junction of the Shanklin sand with the gault. Dr. Mantell having sent a cast of the only specimen found to M. Adolphe Brongniart, that distinguished botanist suggested that it might be either the stem of a young cycadaceous plant or the fruit of a *Zamia*, but the situation and small size of the stalk at the base and the appearance of the scales, induce Dr. Mantell to refer it to the latter.

2. *Abies Benstedi*, Mantell.—From the greensand near Maidstone, Kent. A beautiful cone found by Mr. W. H. Bensted in the quarry in which the remains of the Iguanodon were discovered in 1834, where it was associated with *Fucus Targionii*, and some indeterminate species of the same genus; stems and apparently traces of the foliage of endogenous trees allied to the *Dracæna* (*Sternbergia*), and of trunks and branches of *Coniferæ*. The wood occurs both in a calcareous and siliceous state. The cone found is in every respect such a fruit as the trees to which the wood belonged might have borne. It bears a close resemblance to a fossil from the greensand of Dorsetshire, discovered by Dr. Buckland, and figured in the 'Fossil Flora' of Great Britain under the name of *Abies oblonga* (Fos. Fl. pl. 1.). Unfortunately the outer surface is so much worn that the external figure of the scales cannot be accurately defined; but the sections show their proportionate thickness. There is an opening at the base of the cone occasioned by the removal of the stalk, and an accidental oblique fracture exhibits the internal structure. In the longitudinal section thus exposed the scales are seen to be rounded and broad at their base and to rise gradually, and become thin at their outer terminations. The seeds are oblong, and one seed is seen imbedded within the base of each scale. Mr. Morris considers it to have a great affinity to *Abies oblonga* of Lindley and Hutton, but it is more spherical, and the scales are smaller, more regular and numerous.

3. *Carpolithes Smithiæ*, Mantell.—From the white chalk of Kent. An account of an imperfect specimen of this fruit was formerly given by Dr. Mantell in his 'Illustrations of the Geology of Sussex.' He lately detected a second and more perfect example in the choice collection of Mrs. Smith of Tunbridge Wells, in honour of whom he has named it. Dr. Mantell remarks, that a slight inspection was sufficient to determine its vegetable origin, for several seeds were imbedded in its substance, and others had been detached in clearing it from the chalk. Dr. Robert Brown suggested that the original was probably a succulent compound berry, the seeds appearing to have been imbedded in a pulpy substance like the fruit of the mulberry, which is a spurious compound berry, formed by a partial union of the enlarged and fleshy calices, each inclosing a dry membranous pericarp.

From the occurrence of the cones above described with the drifted remains of land and freshwater reptiles peculiar to the Wealden, Dr. Mantell infers that these fruits belong to the flora of the country of the *Iguanodon*.

"Notice on the fossilized remains of the soft parts of Mollusca." By Gideon Algernon Mantell, LL.D., F.R.S., &c.

Substances presenting the same general appearance and composition with coprolites, but destitute of the spiral structure, are thickly interspersed among the shells which abound in the rocks of firestone or upper greensand at Southborne in Sussex, sometimes occurring in the state of casts of shells of the genera *Cucullæa, Venus, Trochus, Rostellaria*, &c., from the soft bodies of which testacea Dr. Mantell considers them to have originated. They abound also in the layers

of firestone which form the line of junction with the gault, and are not uncommon in the gault itself in several localities in Surrey and Kent.

Dr. Fitton, in his memoir 'On the Strata below the Chalk' (Geol. Trans. vol. iv. part 2. p. 11), has given an account of similar concretions from Folkstone, where he observed them in some cases surrounding or incorporated with fossil remains, and filling the interior of Ammonites. Dr. Mantell has observed them also in the Shanklin sand in Western Sussex, in Surrey, near Ventnor in the Isle of Wight, and in Kent, and they especially abound in the Iguanodon quarry of Kentish rag near Maidstone, belonging to Mr. W. H. Bensted.

Mr. Bensted having long paid attention to this subject, more than two years ago submitted to Dr. Mantell specimens of fossil shells, the cavities of which were filled with a dark brown substance in every respect identical with the nodular and irregular concretions of coprolitic matter which abound in the surrounding sandstone. Mr. Bensted expressed his belief that the carbonaceous substance was derived from the soft bodies of the Mollusca, and that the concretionary and amorphous portions of the same matter dispersed throughout the sandstone of this bed, were masses of the fossilized bodies of the animals which had become disengaged from their shells, and had floated in the sea till enveloped in the sand and mud, which is now concreted to the coarse sandstone called Kentish Rag. In proof of this opinion reference is made to an account published in the 'American Journal of Science' for 1837, of the effects of an epidemic among the shell-fish of the Ohio, which, killing the animals, their decomposed bodies rose to the surface of the water, leaving the shells in the bed of the stream, and floating away covered the banks of the river. Mr. Bensted points out that nearly the whole of the shells in the Kentish rag of his quarry appear to have been dead shells, and infers that their death might have been owing to a similar cause with that which destroyed the *Uniones* in America; while their bodies intermingling with the drift wood on a sand-bank furnished the concretions described in this communication.

The Rev. J. B. Reade submitted some of the substance of these bodies to an analysis by Mr. Rigg, who confirmed Dr. Mantell's suspicion of the presence of animal carbon in it, and states that the darker portion of the substance contains about 35 per cent. of its weight of carbon in an organized state.

Dr. Mantell adds, that a microscopical examination with a low power detects innumerable portions of the periosteum and nacreous laminæ of the shells of extreme thinness intermingled with the carbonaceous matter, together with numerous siliceous spiculæ of sponges, very minute spines of *Echinodermata*, and fragments of *Polyparia*, and remarks that these extraneous bodies probably became intermingled among the soft animal mass before the latter had undergone decomposition. He proposes to term the substance *Molluskite*, and states that it constitutes the dark spots and markings in the Sussex and Purbeck marbles.

MISCELLANEOUS.

ALCHEMILLA FISSA, A. CONJUNCTA, AND A. ARGENTEA.

To the Editors of the Annals of Natural History.

GENTLEMEN,—I observe in the 'Flora Danica,' pl. 2101, published in 1834, a good representation of *Alchemilla fissa*, the same plant which was published last year by Mr. Babington in vol. x. of the 'Annals of Natural History' under the name of *A. conjuncta*, and which I gathered in the Faroe Islands in 1821, and printed in my list of the plants of those islands in 1835 under Don's name, *A. argentea*.

The specimen figured in 'Fl. Dan.' is stated to have been gathered in the Faroe Islands by Dr. Forchammer, whom I accompanied in a tour of those islands in 1821, on my return from which by Copenhagen in the same year, I submitted the herbarium which I had collected to Professor Horneman (editor of 'Flora Danica'), and gave him various specimens, amongst others some of this plant, which he at that time, I believe, considered only a variety of *A. alpina*.

The description given in the 'Flora' is—"*Alchemilla fissa* (Schummel) fol. reniform. 7—9-lobis, lob. profundis, obovatis, inciso-serratis, basi integerrimis, corymbis terminalibus. Mertens et Koch, Flor. Germ. i. p. 830; Schummel in Centur. Silesiac. 9. n. 2; Sturm, Fl. Germ. fasc. 56; Horneman, Fl. Œconom. ed. 3. p. 802 et Suppl."

It appears therefore, that if Don's specific name *A. argentea* is not to be retained, Schummel's *A. fissa* has the claim of priority.

I remain, Gentlemen, yours faithfully,

Oxford, June 8, 1843. W. C. TREVELYAN.

On the Affinities of Glareola torquata. By E. Blyth, Curator to the Museum of the Asiatic Society of Bengal.

HAVING had the good fortune to procure alive a specimen of this bird, I was able at a glance to perceive its true affinities, which heretofore had constantly puzzled me, in common, I believe, with every student of zoology who has bestowed attention on the classification of birds. Linnæus arranged this bird as *Hirundo pratincola*; and Baron Cuvier included its genus among his *Echassiers*, or Stilt-birds, viz. the *Grallatores*, or "Waders" of modern English systematists; remarking—"Nous terminerons ce tableau des échassiers par trois genres qu'il est difficile d'associer à d'autres, et que l'on peut considérer comme formant séparément de petites familles." The three genera adverted to are, *Chionis, Glareola*, and *Phœnicopterus*; which are associated also by M. Temminck in his heterogeneous assemblage of odds and ends, styled by him *Alectorides*. Now, of these three genera, the first, or that of the Sheathbill (*Chionis*), has been satisfactorily referred by M. de Blainville, on anatomical data, to the immediate proximity of *Hæmatopus*, an association of which the propriety is readily seen when once suggested*; and on similar data I

* Allied to *Chionis* are the remarkable genera *Attagis*, d'Orbigny, and *Tinochorus*, Vieillot, from the South American Cordilleras, and the anatomy of these equally refers them to the same systematic station. Vide 'Zoology of the Voyage of the Beagle' under Captain Fitzroy.

have long been satisfied that the Flamingoes (*Phœnicopterus*) should be ranged among the *Lamellirostres* or *Anatidæ*, a position which has also been assigned to them by Mr. Swainson: this latter author, in common with most of the recent British writers on ornithology, has referred the Pratincoles to the *Charadriadæ* or Plover family, associating them more immediately with *Cursorius*; but Mr. Jenyns (in his 'British Vertebrata'), really as if selecting the most *outré* position he could find, has included this genus in his *Rallidæ** ! There, too, Mr. Yarrell (in his 'British Birds') has followed him in grouping it; but this naturalist was so fortunate as to obtain an egg of our present species, which he has figured, and remarks, that "the Pratincole has been arranged by some authors with the Swallows, by others near the Rails; but I believe, with Mr. Selby, that it ought to be included in the family of the Plovers; and had I known its plover-like habits and eggs sooner, I should have arranged it between *Cursorius* and *Charadrius*." The figure of the egg which he has given, however, appears to me to accord still better with my view of the affinities of this genus. Several years ago, Mr. Gould called my attention to the fact that the Collared Pratincole had a slightly-pectinated middle claw, and suggested to me whether, after all, the great Swedish naturalist was not right, at least in bringing this bird among the *Insessores Fissirostres* of Vigors; but at that time I inclined to hold a different opinion, and so far as the structure in question is concerned, that alone could scarcely influence the systematic position of the genus, as it occurs in widely separated families†; and as I have further always held the opinion that the *Pressirostres* and *Longirostres* of Cuvier (corresponding to the *Charadriadæ* and *Scolopacidæ* of modern English systematists) composed but a single great series, essentially distinct from the *Cultrirostres*, Cuv. (vel *Gruidæ* et *Ardeadæ*) which the illustrious French zoologist interposed between the former, an analogous conformation was not wanting in that series, as instanced by the Black-tailed Godwit (*Limosa melanura*), while no trace of it occurs in the Bar-tailed Godwit (*L. fedoa*). Examining, however, the entire foot of a recent Pratincole, it will be seen that the resemblance it bears to that of *Caprimulgus* extends to the peculiar scutation, to the general form of the toes, and especially to the circumstance of the back-toe being directed inward; and whoever has witnessed the creeping gait of a British Moth-hunter (*Caprimulgus*) on the ground, will not fail to recognise in that of the Pratincole an exact similarity: moreover, many species of *Caprimulgus* have the tarse as much elongated as in *Glareola*, and I have been informed that certain of these assemble numerously on the mud-flats near the shores of some of the West India islands, where their habits would appear to resemble those stated of the Pratincoles. The mode of flight, too, of the latter is

* I need not ask what character it has in common with the Rails, but rather what it has not in direct and obvious opposition to them?

† *E. g.*, in many *Caprimulgidæ*, *Ardeadæ*, and *Pelicanidæ*; its intent being apparently to cleanse the *rictus* from such fish-scales, &c. as may adhere thereto, or, in the instance of the *Caprimulgidæ*, to detach the legs of beetles which may ditch, and thus impede the bird's swallowing them.

absolutely that of the Moth-hunters, and not by continuous flappings, as in all the *Charadriadæ*. But what first led me to perceive the affinity which this genus bears to *Caprimulgus*, was the expression of the physiognomy of the living bird, as I held it in my hand, and, to descend to particulars, the semi-tubulate form of its *nares*, and downward curvature of the short bill seen alike in both, though the latter is so much larger and stouter in *Glareola*; then, looking to the feet, the similitude was at least equally striking, while the form of the wings and tail, and mode of flight, were such as might be expected to occur in a diurnal modification of the family *Caprimulgidæ*, and together with the wide gape helped to remove this genus from the grallatorial order altogether. Even the egg, as figured by Mr. Yarrell, has not the pointed form at one end, characteristic of those of the Snipe and Plover series; but would appear to resemble nearly that of a *Caprimulgus*, in shape as well as in markings. On the other hand, the discrepancies of *Glareola* with any of the varied forms of noctural *Caprimulgidæ* * are sufficiently obvious externally, while internally there are some very strongly marked differences; such as the configuration of the sternum, which is doubly emarginated posteriorly, and otherwise more approximates to the form of this important portion of the skeleton of the *Charadriadæ*, while the tongue also is broad and flat, with a thin serrated tip, and the muscular coat of the stomach is considerably developed,—particulars at variance with the type of *Caprimulgidæ*, but which I only now briefly advert to, since I have not lately procured an example of the latter family with which to institute an anatomical comparison. Upon the whole, I have arrived at the opinion that the Pratincoles are more nearly related by affinity to *Caprimulgidæ* than to any other family in the class, but I hesitate as to whether they should be actually included therein, though, if so, I think that they should be regarded as at least constituting a very distinct subfamily, apart from the nocturnal genera, and thus I incline provisionally to arrange them.—*Journal of the Asiatic Society of Bengal*, No. 41. p. 467.

LINES ADDRESSED TO THE REV. W. KIRBY, M.A.

The following verses, communicated by our valued correspondent, Henry Denny, Esq., are so beautiful, and so well adapted for the recommendation of our pursuits, that we make no apology in presenting them to our readers.

To the Rev. William Kirby, M.A., F.R. & L.S. &c. &c.

I know not which to envy most,
Thy knowledge of the Insect host,
Tenants of earth or air;
Or thy acquaintance with each scene
Of barren heath, or meadow green,
To which their tribes repair.

The first has cast around thy name
A purer and a happier fame

* *Caprimulgus, Ægotheles, Podargus, Steatornis, Nyctibius.*

Than e'er was won by arms;
The second must have taught thy heart
Somewhat of wisdom's better part,
Through nature's hidden charms.

For well I ween a heart like thine
Contemplating the hand divine
Thy favourite science shows,
Taught by each proof of power and love,
To Him who dwells and reigns above
With grateful feeling glows.

And such a feeling to extend,
To show how skill and goodness blend
Throughout Creation's plan,
Must rank amongst those wise pursuits
Whose genuine and whose grateful fruits
Are bless'd of God and man.

Yes, every science, love, or art
Which tends to foster in the heart
Knowledge of nature's laws,
Must, sanctified by grace divine,
"Precept on precept, line on line,"
Exalt their First Great Cause!

Pursue, then, my ingenious friend,
Thy search; and mayst thou in the end
Partake a prouder change
Than e'er thy insect tribes can know,
Whate'er of beauty these may show
In transformations strange!

For these, though plumed with splendid wings,
Are still but fair and fragile things,
Which seem but born to die;
Whilst thou, thy web of knowledge spun,
Shalt soar above yon glorious sun
To immortality!

Woodbridge, July 1829. Bernard Barton.

LETTERS FROM RAY TO SIR HANS SLOANE.

On the appropriation of certain Birds to their proper Classes in Ornithology.

[MS. Sloan. Brit. Mus. 4056. fol. 148. *Orig.*]

Sir,—I received yours of the 17th and am very glad that the Box with the Papers is come safe to your hands, though I did not much fear the losse of it. You need not be solicitous about the charge, for there was nothing extraordinary, and yet if there had, I ought in all reason to have born it.

Two things there are I cannot yet fully agree with you in.

1. The referring of the Old-men, or Rain-fowls, to the Cuckow. For the Cuckow is so strange, anomalous, and singular a Bird, and

so remarkable, and taken notice of even by the vulgar, for his voice, manner of breeding, and absconding all winter, that I think no Bird that agreeth not with him in these particulars ought to be joyned with him. Neither is the length of the tail a sufficient argument; for the Yunx, a genuine Woodpecker, hath a tail as long in proportion to his body, and marked with crosse-bars too.

2. In referring the Savanna-bird to the Lark-kind. For that distinction of Small Birds into slender and thick-bill'd, or as our Fowlers phrase it, into soft and hard-beak't, dividing the numerous genera of them almost equally, is of such eminent use for the clear understanding and ranking of them, that I think it ought by no means to be rejected, or the Birds of those kinds confounded, though the places they frequent and their shape and manner of living may agree; and that characteristick note of the Lark-kind may be common to some of them, I mean having a very long back-claw or spurre. I have taken notice of some that agree with Larks in these particulars, as the Bunting and a sort of Mountain Finch. Yet I believe that there is a difference in the diet of those Birds. For the slender-bill'd, though they feed upon the pulp and grains of fruits, yet they seldome meddle with dry seeds unlesse driven by hunger. But the hard-bill'd touch not pulpy fruits, but feed upon dry seeds, as all sorts of grain and thistles, &c. To feed upon Insects is common to them both.

Your opinion or conjecture upon the Rabihorcado's being a kind of fork-tail'd Larus or Sea-swallow, I very much approve, and agree with you in. I fancied that they were no palmiped Bird, because those that write of them wonder that they should be found so far out at Sea. Which is no wonder in a Larus.

My Wife salutes you with the tender of her very humble service. The ulcers upon my leg, which I thought had been perfectly healed and dried up, continuing well all Winter, are this Spring broken out again and become very troublesome and painfull. They puzzle my Philosophy, and I am at some losse how to order them.

I am, Sir, your very affectionate friend and humble servant,

B. N. April 23, —94. JOHN RAY.

The difficulty which a Botanist has to encounter who has not seen the Plants he has to describe, growing in their natural places.

[Ibid. fol. 155. *Orig.*]

SIR,—I received your very kind letter of June 6ᵗ, and long after the acceptable present of your Book: for which I return you many thanks. I cannot but admire your industry and patience in reading and comparing such a multitude of Relations and Accounts of Voyages, and referring to its proper place what you found therein relating to your subject, and that with so much circumspection and judgement. You have done Botanists great service in distributing and reducing the confused heap of names, and contracting the number of Species. But who is able to doo the like? No man but who is alike qualified, and hath seen the things growing in their natural places. For my own part I doe freely acknowledge myself altogether insufficient for such a task, having not seen the plants themselves,

nor of many of them so much as dried Specimens, and of the rest having had but a transient view. I shall therefore put down what I find in late writeres, viz. Plukenet's Phytography ; the remaining six volumes of Hortus Malabaricus ; Father Plumier ; Schola Botanica ; Paradisi Batavi prodrom. ; Floræ Batavæ Flores ; Tournefort's Elem. Botan. ; Breynius his two Prodromi ; and, above all, your Catalogue and History of the Plants of Jamaica and the neighbour Islands, which you are pleased so frankly to offer me the use of, without interposing my own judgement. Did I live about London, and had I opportunity frequently to visit the Physick Gardens thereabouts, and to observe and describe the new species, I might make a better Supplement to my History than now I shall doe, my circumstances not admitting so long an absence from this place. I have been lately very ill and indisposed with a hoarsenesse and violent cough, attended with a feverish heat, of which I am not yet fully recovered. I hope you are well, and pray for your health. My wife sends her very humble service. I must owne myself to be much obliged to you, and am, Sir,

Your very affectionate friend and humble servant,

Black Notley, June 23, —96. JOHN RAY.

METEOROLOGICAL OBSERVATIONS FOR MAY 1843.

Chiswick.—May 1. Cloudless: cold and dry. 2. Fine. 3. Very fine. 4. Cloudy and fine: rain. 5. Rain : cloudy: constant and very heavy rain at night. 6. Heavy rain : clear and cold at night. 7. Clear and fine : showery : frosty at night. 8. Hazy : heavy rain. 9. Drizzly : cloudy. 10. Slight haze : clear and cold at night. 11. Light haze : clear. 12, 13. Very fine. 14. Cloudy and fine : heavy rain at night. 15, 16. Rain. 17. Heavy showers. 18. Densely overcast: cold rain. 19. Rain : cloudy. 20. Cloudy : showery : heavy rain at night. 21. Fine : heavy rain : clear and cold at night. 22. Heavy showers. 23. Cloudy : lightning with rain at night. 24. Heavy rain : clear. 25. Cloudy and fine. 26. Rain. 27, 28. Showery. 29. Hazy. 30. Light haze : very fine : showery. 31. Cloudy and mild.—Mean temperature of the month 3° below the average. The quantity of rain was greater than that which has fallen in any month within at least the last seventeen years.

Boston.—May 1, 2. Fine. 3. Cloudy. 4. Fine. 5. Cloudy : rain early A.M. 6. Rain : rain A.M. and P.M. 7. Cloudy. 8. Cloudy : rain P.M. 9—11. Cloudy. 12. Fine. 13. Cloudy : rain P.M. 14. Fine. 15. Rain : rain P.M. 16. Cloudy : rain early A.M. 17. Cloudy. 18, 19. Cloudy : rain early A.M. 20. Cloudy. 21. Cloudy : rain early A.M. : rain P.M. 22. Fine. 23. Cloudy : rain A.M. 24. Windy : rain A.M. 25. Fine : rain A.M. 26. Fine. 27. Fine : rain, with thunder and lightning P.M. 28, 29. Fine. 30. Fine : halo round the sun 11 A.M. 31. Cloudy : rain early A.M. This has been the wettest May we have had since 1830.

Sandwick Manse, Orkney.—May 1. Fine : fog. 2. Cloudy : fog. 3. Clear : cloudy. 4. Rain : cloudy. 5. Cloudy : clear. 6. Clear : cloudy. 7. Rain : cloudy. 8. Clear. 9. Clear : cloudy. 10, 11. Clear : fine. 12—14. Cloudy. 15—17. Clear. 18. Cloudy : fine. 19. Cloudy : showers. 20. Bright : clear. 21. Bright : cloudy. 22—24. Bright : clear. 25. Rain. 26. Cloudy. 27. Damp. 28. Cloudy : sleet-showers. 29. Snow-showers : sleet-showers. 30. Bright : fine. 31. Clear : fine.

Applegarth Manse, Dumfries-shire.—May 1—3. Fair and fine. 4. Fair till P.M. : rain. 5. Heavy showers. 6. Fair and fine. 7. A shower. 8, 9. Fair. 10, 11. Fair : hoar-frost. 12. Fine : rain P.M. 13. Fine and mild. 14. Fine, but cloudy. 15. Showers. 16. Cloudy and cold. 17. Cool : cloudy. 18. A shower. 19. Cold. 20. Cold : fair. 21. Cold : wet. 22. Milder, but showery. 23. Mild : cloudy. 24. Cold and rainy. 25. Soft rain. 26. Mild : showers. 27. Mild : showery. 28. Cold and rainy. 29. Clear : heavy rain. 30. Soft : growing : thunder. 31. Wet all day.

Meteorological Observations made at the Apartments of the Royal Society, LONDON, *by the Assistant Secretary*, Mr. Roberton; *by* Mr. Thompson *at the Garden of the Horticultural Society at* CHISWICK, *near London; by* Mr. Veall, *at* BOSTON; *by the* Rev. W. Dunbar, *at Applegarth Manse*, DUMFRIES-SHIRE; *and by the* Rev. C. Clouston, *at Sandwick Manse*, ORKNEY.

Days of Month. 1843. May.	Barometer. London: Roy. Soc. 9 a.m.	Barometer. Chiswick. Max.	Barometer. Chiswick. Min.	Barometer. Boston. 8½ a.m.	Barometer. Dumfries-shire. 9 a.m.	Barometer. Dumfries-shire. 9 p.m.	Barometer. Orkney, Sandwick. 9½ a.m.	Barometer. Orkney, Sandwick. 8½ p.m.	Thermometer. London: R.S. Fahr. 9 a.m.	Thermometer. London: R.S. Self-reg. Mx.	Thermometer. London: R.S. Self-reg. Mm.	Thermometer. Chiswick. Max.	Thermometer. Chiswick. Min.	Thermometer. Boston. 8½ a.m.	Thermometer. Dumf.-shire. Max.	Thermometer. Dumf.-shire. Min.	Thermometer. Orkney, Sandwick. 9½ a.m.	Thermometer. Orkney, Sandwick. 8½ p.m.	Wind. London: R.S. 9 a.m.	Wind. Chiswick. 1 p.m.	Wind. Boston.	Wind. Dumfries-shire.	Wind. Orkney, Sandwick.	Rain. London: R.S. 9 a.m.	Rain. Chiswick.	Rain. Boston.	Rain. Dumfries-shire.	Rain. Orkney, Sandwick.	Dew-point. Lond. R.S. 9 a.m.
1.	30·130	30·140	30·065	29·40	30·22	30·25	30·50	30·49	59·8	65·0	52·3	70	42	55	67	41	51	44	e.	e.	e.	ene.	wnw.	......	......	......	......	......	49
2.	30·186	30·124	30·004	29·66	30·21	30·08	30·39	30·37	59·0	67·7	49·0	69	40	55·5	65	41	47	43	e.	e.	e.	ne.	se.	......	......	......	......	......	51
3.	29·942	29·891	29·778	29·47	29·78	29·70	30·00	29·67	46·0	67·2	43·7	66	44	46	69	38	48	46	e.	ne.	e.	ne.	w.	......	·06	......	......	......	45
4.	29·808	29·768	29·680	29·26	29·60	29·40	29·56	29·55	58·7	62·3	46·3	66	45	54	66	38	47	45	s.	sw.	calm	nw.	nw.	·022	·16	......	......	·17	50
5.	29·720	29·676	29·662	29·09	29·40	29·35	29·53	29·50	56·2	64·8	50·4	63	42	52	52	38	47	43	s.	sw.	calm	w.	e.	·158	1·26	·04	......	·09	52
6.	29·392	29·623	29·258	28·93	29·44	29·36	29·40	29·53	47·4	62·2	48·2	53	32	44	58	42	49	44	nnw.	w.	calm	w.	s.	1·133	·38	·40	......	......	51
☽ 7.	29·676	29·638	29·601	29·11	29·34	29·50	29·40	29·74	52·3	70·6	40·3	59	29	50·5	55½	41½	46	45	s.	s.	calm	s.	e.	·300	·05	·63	......	·55	45
8.	29·596	29·579	29·521	29·70	29·62	29·73	29·96	30·07	45·5	60·6	42·3	49	42	51	55	38	48	44	nne.	e.	e.	e.	e.	·036	·57	......	0·22	......	45
9.	29·642	29·861	29·604	29·22	29·78	29·92	30·12	30·18	47·2	49·5	44·2	54	39	51	58½	42	47½	43	n.	ne.	e.	ne.	e.	·463	·02	·06	......	......	45
10.	30·044	30·136	29·983	29·54	30·05	30·10	30·25	30·28	50·7	54·7	46·2	57	33	52	61	37	46½	41	n.	e.	calm	ese.	e.	......	......	......	......	......	46
11.	30·234	30·184	30·165	29·78	30·11	30·06	30·25	30·22	49·2	56·4	43·8	62	34	47·5	63½	35½	47	42	n.	ne.	calm	s.	se.	......	......	......	......	......	45
12.	30·202	30·159	29·879	29·67	30·00	29·74	30·13	29·96	56·7	64·6	46·3	67	46	57	66	37½	45	44	s.	sw.	calm	s.	ese.	......	·02	......	......	......	47
○ 13.	29·948	29·904	29·858	29·31	29·60	29·68	29·82	29·86	56·2	66·2	52·6	66	42	57	55	48	46	46	s.	w.	calm	s.	ese.	·033	......	......	......	......	51
14.	29·848	29·795	29·552	29·25	29·69	29·53	29·86	29·86	56·7	64·4	48·8	64	50	63	61	42	47	43½	s.	s.	calm	ne.	e.	......	·18	·06	......	......	50
15.	29·544	29·509	29·497	28·90	29·50	29·48	29·82	29·86	55·2	69·0	51·0	65	47	52	49	45	47	43	s.	sw.	calm	se.	e.	·219	·14	·48	......	......	53
16.	29·432	29·497	29·386	28·92	29·48	29·50	29·86	29·95	54·8	63·5	50·7	62	50	56	50	45	49½	44	e.	ne.	calm	se.	e.	·100	·07	·17	0·30	......	51
17.	29·518	29·671	29·476	29·05	29·65	29·82	29·97	30·07	52·2	59·3	51·2	52	43	52	56	44	49	43	w.	ne.	calm	s.	e.	·063	·20	......	......	......	52
18.	29·850	29·901	29·798	29·05	29·90	29·96	30·15	30·18	47·7	58·6	45·3	48	45	52	49	40	49	44	n.	ne.	calm	se.	nw.	·283	·04	·58	......	......	46
19.	29·928	29·893	29·886	29·50	29·95	29·90	30·16	30·15	48·3	52·0	46·3	60	46	51	54	35	50½	44	e.	ne.	e.	e.	ne.	·080	·02	·09	......	......	48
20.	29·884	29·830	29·641	29·44	29·80	29·78	30·13	30·13	55·0	56·3	49·0	62	48	55	60	43	48½	44	e.	e.	e.	se.	e.	......	·44	......	......	·07	48
☾ 21.	29·696	29·649	29·637	29·16	29·62	29·60	30·01	30·08	56·3	59·3	50·8	64	39	54·5	53	43	51	48	s.	s.	calm	se.	e.	·302	·05	·39	......	......	52
22.	29·718	29·687	29·653	29·10	29·62	29·63	30·03	30·03	56·8	65·3	47·8	56	45	60	56	42	50	47	sse.	sw.	calm	se.	ne.	·063	·09	·41	......	......	51
23.	29·750	29·784	29·616	29·16	29·65	29·65	30·03	30·05	57·5	62·2	51·6	63	52	54	56½	45	53½	47	sse.	se.	calm	se.	e.	·086	·53	......	......	......	52
24.	29·532	29·553	29·479	29·02	29·62	29·55	30·05	30·00	54·2	62·6	53·8	68	44	56	51	41	52	48	e.	s.	e.	e.	e.	·380	·06	·09	0·10	......	54
25.	29·676	29·677	29·605	29·03	29·52	29·45	29·80	29·52	59·8	73·4	51·0	67	41	62	65	45	48½	48	s.	sw.	calm	s.	e.	......	·03	·12	......	......	53
26.	29·754	29·697	29·457	29·05	29·40	29·32	29·49	29·42	60·2	68·2	50·6	66	45	60	56	...	52	49	s.	sw.	w.	s.	se.	......	·20	·03	......	1·12	55
27.	29·570	29·535	29·433	28·90	......	29·10	29·42	29·54	59·8	65·7	50·3	63	43	59·5	61	...	53½	44½	se.	sw.	calm	se.	ne.	·036	·14	......	......	......	55
28.	29·560	29·802	29·520	28·96	......	29·70	29·70	29·82	56·7	63·0	47·8	65	44	58	55	40	45½	38	s.	w.	w.	sw.	n.	·150	·16	·20	......	......	52
● 29.	29·966	30·032	29·912	29·40	29·80	29·90	29·83	29·92	48·2	62·2	48·2	54	34	54	57½	42	39	40	e.	e.	calm	w.	nw.	·211	·30	......	......	·27	46
30.	30·144	30·084	29·953	29·54	29·90	29·82	29·98	29·97	54·3	61·7	42·3	64	48	57	56	45	40	43	e.	s.	calm	w.	nw.	·175	·03	......	1·50	·04	49
31.	29·906	29·854	29·813	29·26	29·60	29·60	29·86	29·82	59·3	64·6	51·7	67	54	59	54	44	47	42	sw var	w.	calm	e.	nw.	·016	·06	·05	......	......	54
Mean.	29·800	29·810	29·689	29·25	29·722	29·683	29·918	29·928	54·1	64·3	48·2	61·64	42·84	54·4	57·7	41·3	47·98	44·19						Sum. 4·309	5·26	3·80	2·12	2·31	Mean. 50

THE ANNALS

AND

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IX.—*Observations on the Habits of a large species of* Galeodes. By Captain Thomas Hutton *.

In the 52nd and 53rd Numbers of the 'Annals and Magazine of Natural History' are two letters from Messrs. W. S. MacLeay and W. E. Shuckard, relating to the occasional capture of small birds by certain species of *Arachnidæ*; and as the subject is one of some interest, I take the liberty of presenting you with a note long since made by me, on the habits of a large species of *Galeodes* common to some parts of India, and for which, if undescribed, I would propose the name of "*Galeodes vorax*."

My first observations on this species were made in 1832 at Mirzapore, where it is very abundant and of large size. During the rainy season it was my constant habit, on a fine evening, to spread a sheet upon the ground near my house, upon which was placed a small lantern to attract insects.

In a very short time, two or three of these ravenous spiders would make their appearance at the edge of the sheet, but at a respectful distance from each other, and no sooner did a moth, or a beetle, or a cricket alight upon it, than it was snapped up and devoured before I could lay hold of it. There seemed indeed to be no end to the appetite of these creatures, for they continued to seize and devour everything indiscriminately that came within their reach, even to large and hard-winged beetles, cutting them to pieces with their powerful jaws with the greatest ease. Many were the deadly fights I witnessed among these marauders as they trespassed upon each other's beats to get possession of some newly alighted prey, and often was I obliged to kill them in order that I too might in turn obtain some share of the booty. This species is, strictly speaking, nocturnal, though I have sometimes seen them active in the daytime; they live beneath stones and in holes in the ground, and never construct a net or other trap for their prey, seizing everything by main force as they roam about in search of food.

Again I fell in with this species abundantly at Neemuch, where

* From the Journal of the Asiatic Society of Bengal, No. 45.

they were also sometimes of large size. One of these I kept for some time in a vessel, the bottom of which was well supplied with earth, which had been purposely hardened by pouring water on it and then allowing it to dry.

The *Galeodes* soon began to dig a hole, and in a very short time succeeded in making itself a subterranean retreat, in which it usually resided, seldom coming forth beyond the mouth of its den. It proceeded to dig out the earth at first with its strong jaws, cutting it away in a circle, and having thus loosened the soil, it gathered it together into a heap with its anterior palpi and threw it out behind, as a dog does in scratching a hole. When it had by this means succeeded in excavating a hole sufficiently large for it to enter, instead of throwing out the loose earth as at first, it gathered a quantity together, and surrounding or embracing it with the anterior palpi, shoved the load by main force before it up the mouth of the cave, and then returned for more. Having completed its task, it remained for a few days stationary and refused to feed, although previously it would devour several insects at a meal, and even small house lizards. I now perceived that it was a female, the ova being distinctly visible through the skin of the abdomen, which was much distended.

The ova were deposited in the cave, to the number of more than fifty, the parent remaining motionless amidst them. In the course of a fortnight, these, which were of the size of a largish mustard-seed, and of whitish hue, were all hatched.

The young are at first motionless, and appear devoid of animation until the period of three weeks has elapsed, at which time they cast the first skin. Their colour, which up to this time was pure milky white, now gave place to a faint tinge of pale brown, and the jaws and palpi became deep brown.

The young ones now threw off their lethargy and began to move about, and occasionally sallied forth from the den, but instantly retreated on the slightest appearance of danger. All this time, however, they took, apparently, no food whatever, and yet they continued to grow both in size and activity.

It was indeed very interesting to watch the motions of the parent at this season. From the general bad and ferocious character which the spider tribe bears, I fully expected to see the parent, at the first craving of appetite, commence an attack upon her own family and devour them; but the all-wise Creator has endowed even this ferocious spider with that most powerful feeling—maternal love; and thus is the *Galeodes,* the very tiger of the insect world, subdued at this period into the anxious and tender mother. Placing herself in front of the aperture of the cave, she seized and examined between her anterior palpi everything that entered. I tried repeatedly to arouse her anger by thrusting in straws,

hoping to make her forget her good behaviour, but all in vain; for though she bit and pulled at the straws in evident anger, not once did she turn upon her offspring, although crowding round and crawling over her very body. I then threw in some beetles and flies, upon which she vented her fury by speedily devouring them, and I thought by this means to play her a trick. Accordingly I withdrew two or three of the young ones from the cave, and threw in alternately a beetle and a young *Galeodes*, thinking to deceive the parent, and make her, in the blindness of her fury, *commit infanticide*. But nature was not to be thus deceived: the unfortunate beetles were instantly seized and devoured, but the mother knew her offspring, and drew them into the den without the slightest injury; the beetles were gathered into her jaws, but her own offspring were merely seized between the anterior palpi, and allowed to pass unhurt.

This whole family, much to my regret, effected their escape from the vessel in which I kept them, which, being of glass and deep-sided, I thought sufficiently secure, and therefore left uncovered.

The *Galeodes*, however, being furnished with a *retractile sucker* at the ends of the anterior palpi, had contrived to crawl up the side of the glass and make their escape. I succeeded more than a month afterwards in recapturing the old one in the same room, but her offspring I never again saw.

This species is extremely voracious, feeding at night upon beetles, flies, and even large lizards, and sometimes gorging itself to such a degree as to render it almost unable to move.

A lizard three inches long, *exclusive of tail*, was entirely devoured; the spider sprung at it, and made a seizure immediately behind the shoulder, never quitting its hold until the whole was consumed. The poor lizard struggled violently at first, rolling over and over in its agony, but the spider kept firm hold, and gradually sawed away with its double jaws into the very entrails of its victim. The only parts uneaten were the jaws and part of the skin, although the lizard was at least five inches long from nose to extremity of tail. After this meal the spider remained gorged and motionless for about a fortnight, being much swollen and distended.

A young sparrow, about half-grown, was placed under a bell-glass with a *Galeodes*; the moment the luckless bird moved the spider seized him by the thigh, which he speedily sawed off, in spite of the sparrow's fluttering, and then, as the poor bird continued to struggle in pain, the savage seized him by the throat and soon put an end to his sufferings by cutting off the head. It *did not, however, devour the bird nor any part of it,* but seemed satisfied with having killed it.

On another occasion I gave it a large garden lizard, which was instantly seized by the middle of the body; the lizard, finding that it could not shake off its adversary, turned its head and bit the *Galeodes* on one leg, which obliged it immediately to quit its hold and retreat: this was owing to the seizure having been made too low down on the body, for in general the *Galeodes* seizes as close behind the shoulder as can be, in order to put it out of the victim's power to turn and bite; the lizard was allowed to escape with only a severe wound in the side, but as it lived for some days before I allowed it to run off, the bite of the *Galeodes* would not appear to be poisonous.

On another occasion, my friend Dr. Baddeley confined one of these spiders in a wall-shade with two young musk rats (*Sorex Indicus*), both of which were killed by it.

When two of these spiders are confined in a vessel together, both endeavour to make their escape, as if conscious of their mutual danger. If, in their efforts to get away, they are brought into contact, the one instantly seizes the other and devours him, the victim making no struggles whatever; but if they meet face to face, both enter into a wrestling-match for life or death.

They plant their true feet firmly on the ground, the body at the same time being elevated, and the two pairs of palpi held out in front to ward off the attack. In this attitude they advance and retire, according as either gains a slight advantage, endeavouring to throw each other to one side, so as to expose some vulnerable part, or form an opening for attack; and when this is once effected, the fortunate wrestler instantly takes advantage of it, and rushing in seizes his adversary behind the thorax, and the combat is ended; the vanquished victim yielding himself without further struggle to his inevitable fate.

The same species occurs in the Bhawulpore country, from whence I obtained it when constructing the road for the advance of the army of the Indus in 1838. It is also abundant in Afghanistan, where in all probability it is the species mistaken by Elphinstone for the *Tarantula*, which he describes as common in that country, but which I neither saw nor heard of.

The usual size of an adult specimen of "*Galeodes* (*vorax*)," mihi, is about $2\frac{1}{2}$ to $2\frac{3}{4}$ inches long, and the body or abdomen equal to a thrush's egg. When in motion the body is elevated off the ground, and the two pairs of palpi or feelers are stretched out ready to make a seizure: it progresses therefore solely upon the true legs, which spring from the thorax, and are six in number. The head is armed with two strong and formidable chelæ, or double jaws, answering to the long cheliform fore-arms of the scorpion; these jaws are denticulate, and the ends are curved, sharp-pointed, and extremely hard and horny, of a dark brown

colour. Eyes two, and placed on the top of the head between the base of the jaws; the colour generally is sandy brown, and the body soft and clothed with short mouse-coloured hairs; the limbs, and especially the palpi, are furnished with long coarse hairs; beneath these are ten obtriangular plates springing from the under side of the thigh or coxæ of the posterior legs, five on each, the inner one being smallest, the outer one largest; these are of an obtriangular form, and their use appears to be still unknown. I never saw them used to assist progression in any way.

The true legs are furnished at the end with strong hooks or claws, but the two pairs of pedi-palpi are destitute of them, the anterior pair being the largest and strongest, and furnished at the end with a white retractile sucker; this, in a state of rest, is withdrawn into the last joint of the palpi, and it appears to be used to assist in climbing up surfaces, or in hanging against gravity, in the same way that flies and lizards use their feet, by the exclusion of air. In seizing its prey, one pair of jaws keeps hold, while the other is advanced to cut, and they thus alternately advance and hold till the victim is sawed in two: the only sound they emit is a hissing or rustling, caused by the friction of the two pairs of chelæ as they are advanced and withdrawn; this is only heard when the spider is suddenly disturbed or irritated.

From the tenor of Mr. W. S. MacLeay's remarks upon *Mygale* and the large species of *Epeira* which he has discovered in the vicinity of Sydney, it would appear, that although these spiders may occasionally feed upon the juices of warm-blooded animals, which accident may throw in their way, yet that their natural food consists of insects, and the fact of their killing birds at all must be regarded as a very rare exception to the general rule of their habits; and from the above remarks on *Galeodes* it will be seen that the habits of this spider in some measure corroborate Mr. MacLeay's opinion; for although, strictly speaking, the proper food of *Galeodes* consists of insects, yet, when accident throws a lizard in its way, it will not fail to seize and devour it. With regard however to its preying at all upon warm-blooded animals, we have as yet no testimony whatever, for in the experiments above cited it will be observed, that although the sparrow and musk rats were easily killed by the spider, yet that it fed upon neither of them*.

* Should this paper meet the eye of Mr. MacLeay, I may add, that I shall be happy to do my best in determining the habits and œconomy of any species found in my neighbourhood, if he will kindly point out his wants and wishes, and I shall likewise be happy to assist him with duplicates from my own collection.

Mussoorree, June 21st, 1842.

X.—*Observations on a Disease, the production of a Fungus, occurring in the Lettuce and other Vegetables.* By Arthur Hill Hassall, Esq.

The production of diseases through the agency of Fungi, whether in the animal or vegetable fabric, has not hitherto received that degree of consideration to which the frequency of their occurrence and the importance of the subject so eminently entitle them.

While walking in the garden this evening, I was particularly struck with the appearance of some of the lettuces contained in a fine bed of that vegetable, several of them having become wrinkled and discoloured, although a few days previously I had especially remarked their healthy and vigorous growth.

On examining several of the affected plants I found a considerable softening of the stem near the ground, and which, my mind having been previously prepared for such a phænomenon by my investigations respecting the decay of fruit, I did not hesitate at once to attribute to the action of a fungus,—a conclusion which was confirmed by a microscopic examination of the stem, by which the thalli or root-like filaments of the fungus were detected without difficulty.

In one of my papers on the Decay of Fruit, read before the Microscopical Society of London, I stated that if apples were inoculated with the thallus or sporules of fungi while still maintaining a firm connexion with the parent tree, nevertheless that they became affected with decay; and from the result of this experiment I concluded that the development of the fungi was the *cause* and not the *effect* of the decomposition, a fact which I conceive to be incontrovertibly established; and in confirmation of which, if any further evidence were needed, the present example of the independent operation of fungi would afford that additional evidence; for of the healthy condition of the lettuces prior to the attack of the fungi no doubt could be entertained, this being abundantly testified by the appearance of the unaffected plants.

That this disease is communicable by inoculation in the same way as the similar affection occurring in fruit I cannot doubt; I will however make the trial and communicate the result in a note to this paper.

Were the example which I have now recorded of disease in vegetables, the product of the operation of fungi, an isolated one, it would still be possessed of considerable interest; but so far from this being the case, I have not the least hesitation in asserting, that the majority, if not the entire, of culinary as well as ornamental plants are subject to a similar fatal disorder. Amongst the former class I would particularly mention the following, in all of which I have noticed the peculiar softening observed in the stem of the lettuce:—endive, celery, potatoe, cabbage, pea, bean,

turnep, radish, parsnep, carrot, cucumber, and other cucurbitaceous plants.

The productions most liable to this fungoid disease would appear to be the more succulent kinds, and this fact accounts for the greater frequency of the disease in damp seasons.

Cheshunt, June 9th, 1843.

Note, July 17th.—The same evening on which I noticed the disease in the lettuce, I introduced the filaments of the fungi into numerous unaffected lettuces in different stages of growth and widely separated from each other, and in a few days I had the satisfaction, which I anticipated, of beholding the complete and perfect success of the experiment, and finally, the destruction of all the plants inoculated.

Encouraged by the marked success which attended the inoculation of the lettuces, I determined to treat in a similar manner vegetables of different kinds, feeling however considerable doubt as to the issue of this new experiment. I therefore inoculated the stems and seed-vessels of beans and peas, the stem and tuber of the potatoe, the top root of the turnep, leaves of rhubarb, and stem and leaves of the cabbage. At the same time I inoculated also the but little developed fruit of the apple, peach and gooseberry. Now a result no less satisfactory than in the previous case followed the inoculation of the productions above enumerated, differing from each other too as many of these do so widely in texture and affinities, the progress of the ravages of the fungi being however greatly modified by the condition as to density of the vegetable, or portion of the vegetable operated upon. Thus, their devastating progress in the tuber of the potatoe, in the top root of the turnep, and in the seed-vessel of the bean was very rapid, as might have been expected, since these consist almost entirely of loose cellular tissue and fluid which could offer but little resistance to the extension of the fungi; while in the stems of the potatoe, bean and pea, the progress was much slower, owing solely to the greater density of the parts.

The singular fact of the rapid development of fungi when introduced into the living vegetable œconomy, materially affects the views generally entertained as to the office and power of fungi in creation.

One of the greatest peculiarities of the fungi consists in the preference which they manifest for organic matter in a concentrated form. But it has hitherto been supposed that their powers were confined to dead organic matter* which they speedily de-

* This statement is by no means correct; the researches of Ehrenberg, Meyen, and many other physiologists have long since proved the falsity of this now antiquated notion. The inoculation of sound fruit with fungi was made so far back as 1819 by Prof. Ehrenberg. See his memoir 'De Mycetogenesi epistola,' Nova Act. Nat. Cur. vol. x.—Ed.

compose, assimilate and remove from the fair face of Nature, and hence they have earned the not inappropriate, though inelegant, appellation of "Nature's scavengers." This however is taking but a very limited view of the powers and operation of fungi, since the present inquiry proves that they have the ability to invade and destroy the living vegetable fabric, and perhaps animal too; and this not merely while the vegetable is in a living state, but while the functions of its life are in full and healthy operation. Thus, in the operation of the fungi, as in most things, there is, as regards man's welfare, a mixture of good and evil, of benefit and disservice; the good result accruing to man, however, far outbalancing the evil.

Inquiries such as the present are peculiarly interesting, not merely from their value in a scientific point of view, but from the hope which they carry with them, amounting in this case almost to a conviction, that ultimately they will be attended with practical results. I hope that at no distant day a remedy will be found for some of the evils occasionally resulting to the vegetable world through the instrumentality of fungi.

XI.—*On two new species of British* Jungermanniæ. By Thomas Taylor, M.D., Dunkerron, Kenmare *.

Jungermannia riparia, *MSS. T. T.* Caule procumbente, subramoso; foliis subapproximatis, amplexicaulibus, oblongo-orbiculatis, concavis, integerrimis: fructu terminali; calycibus obovatis, apice plicatis.

Jung. pumila, Lind. Syn. Hep. p. 69. t. 2. (nec *Witheringii*).

Ad rivulorum umbrosorum ripas saxosas Hiberniæ, Britanniæ atque Germaniæ.

Caules procumbentes ramosi, subimplexi atque subcespitosi, 1—2 unciales, luride virides. *Folia* subimbricata, basi amplexicaulia, concava subrotunda aut parum elongata, patula, integerrima, cellulis majoribus. *Perichætialia* majora, calycis dimidium inferius tegentia. *Calyces* obovati seu oblongi, juniores etiam obtusi, apice plicati, plicis sæpius octo. Pedicellus semiuncialis. Capsula oblonga, quadrivalvis. *Perigonia* in rami medio sita vidi, ex foliis paucis, adpressis, basi ventricosis, antheram solitariam tenentibus conflata.

It is probable that the present species is extremely common, and that it has long been confounded by others, as well as certainly by myself, with *Jung. pumila*, With. The specimen collected by me in the river Dayle in 1813, and quoted under *J. pumila* in 'The British Jungermanniæ,' belongs to the present. It has been gathered long ago and carefully laid aside for further examination by Dr. Greville: his specimens are from Breadalbane. Again, Mr. William Wilson found the plant near Bangor Ferry in

* Read before the Botanical Society of Edinburgh.

Wales, Mr. G. J. Lyon at Campsie, and Mr. Spruce at Eskdale; lately I have seen it at Blackwater Bridge and at Turk Waterfall, both in the county of Kerry. Lindenberg too seems to have referred the present to *Jung. pumila,* With., from which the following marks will sufficiently distinguish it: 1. the paler colour; 2. the larger size; 3. the leaves more distant, amplexicaul, more concave, broader and rounder; 4. their cells much larger; 5. the calyx less exserted out of the *perichætium*; 6. the calyx never acuminated, as is constant and characteristic in *Jung. pumila,* With.; 7. the calyx distinctly plicate above. From *Jung. sphærocarpa,* Hook., the present differs,—1. by the larger and more procumbent stems; 2. the calyx plicate above, longer and less wide; 3. the leaves not exactly orbicular, but rather terminating in the figure of a parabola. The present species approaches to *Jung. autumnalis,* DeCandolle, which has been found not only on the continent of Europe but likewise in North America, and which may be confidently looked for in the British Isles, where, however, it has hitherto been unnoticed. In *Jung. autumnalis,* DeCand., 1. stipules are present, especially about the terminations of the young branches; 2. the leaves have a more vertical position, and are more adpressed to the stem; 3. their colour is rufescent, and 4. they are distinctly marginated.

Jungermannia reclusa, *MSS. T. T.* Caule repente, implexo, subpinnato; foliis approximatis, semiverticalibus, rotundato-quadratis, bifidis, perichætialibus majoribus erectis; fructu ramulo proprio insidente; calyce cylindraceo-ovato, apice acuminato subtrigono, ore denticulato; capsula ovata.

In cryptis ericetorum Boream spectantibus, humidis, sæpius occurrit prope Dunkerron, Hiberniæ.

Cespites lati, tenues seu superficiales, fuscescentes, ex quibus calycum apices plurimi, albidi, sparsim surgunt. Caules filiformes, subflexuosi, subpinnati. Folia heteromalla, minutissima, magnitudine folia *Jung. byssaceæ* Roth. vix excedentia, latissima, ovata, bifida, seu potius alte emarginata, laciniis conniventibus, cellulis discretis, minoribus. Stipulæ nullæ. Calyces ore albidi, subtrigoni, eminentes, acutiusculi, dentati.

It is very possible that Lindenberg's var. *b.* of *Jung. bicuspidata,* L., is the same as our plant, if we may judge from the scanty description, but the species differ by numerous minute yet constant marks. *Jung. reclusa* is, 1. of much smaller size, approaching in this respect to *Jung. byssacea,* Roth.; 2. the leaves are shorter than in *J. bicuspidata,* L.; 3. they are more opake; 4. more concave; 5. their shallower emargination is more rounded; 6. they are more crowded; 7. they point to one side, viz. upwards; 8. they are rotundato-ovate; 9. their cells are more minute, and yet separated from each other by larger vessels; 10. the *perichætium* is shorter, and its leaves less acuminated; 11. the stems are wider

in proportion to the leaves; 12. the colour of the plant is darker, and when fresh of an olive-green; 13. the growth is more tufted; 14. the calyx, though absolutely less than in *Jung. bicuspidata*, L., yet, relatively to the size of its own leaves and stems, is greater and more elongated; 15. the calyx is narrower above; 16. the capsule is far shorter in figure and quite characteristic; 17. the *gemmæ* are smooth, never angular, and situated on clusters of leaves and not on a naked *capitulus*. It only remains to add, that our plant differs from *Jung. connivens*, Dicks., by smaller size, much minuter reticulation, by the leaves not being decurrent, by its subpinnate habit, to say nothing of the less tumid and more acuminated calyx.

April 18, 1843.

XII.—*List of Birds obtained in the vicinity of Calcutta, from September* 1841 *to March* 1843 *inclusive.* By Edward Blyth, Curator to the Museum of the Asiatic Society of Bengal.

1. *Palæornis Alexandrinus*; *P. Nipalensis*, Hodgson, 'As. Res.' xix. 177. A hill species, not usually met with in the low country, but has occasionally been observed in the Calcutta Botanic Garden.

2. *P. torquatus*. Very abundant, in flocks of from two or three to twenty. I have seen a pair alight and walk about on the parapet of a house. Flight rapid, and their screaming cry is frequently emitted on the wing, announcing their approach.

3. *P. Bengalensis*. This beautiful species is much less common than the last, though still not rare. It is also less noisy, and I have always observed it in small flocks.

4. *P. Pondicerianus*. This fourth Bengalese species is almost exclusively confined to the hills, but is brought in tolerable abundance to the Calcutta shops. It has not been observed by Mr. Jerdon in the peninsula of India, though named *Pondicerianus*; but it is plentiful on the opposite coast of the Bay of Bengal, and as I saw numerous parrots of this genus flying across the bay, when making for Madras, it might be inferred that the same species inhabit both coasts; though perhaps this may apply only to *P. torquatus* and *P. Bengalensis*, which are frequent in the plain country*.

* The only additional species of this genus known to me, except the Australian (so-called) *P. Barrahandi*, are, in India, *P. schisticeps*, Hodgson, 'As. Res.' xix. 178, peculiar to the Himalaya, and *P. columboides*, Vigors, on the Neilghierries: the Malay countries produce *P. Malaccensis*; and I have just received a female specimen from the Mauritius, which is probably referable to *Ps. bitorquatus*, Kuhl: *P. xanthosomus*, Bechstein, said to inhabit Ternate, rests on the authority of a description by Levaillant, who saw a living specimen. The remaining described species in Mr. Vigors's Monograph of this genus (Zool. Journ. ii. 49 *et seq.*) are merely nominal. Closely allied to *Palæornis* is my genus *Psittinus* (Journ. As. Soc. Beng. xi. 789), founded on the *Psittacus Malaccensis*, Latham, not of Gmelin, and apparently comprising the remarkable *Ps. setarius* of Temminck.—E. B.

N.B. I am uncertain whether to include the little *Psittaculus vernalis*, Sw., which is brought in great numbers to the shops of the Calcutta dealers, most probably from the hilly parts of Bengal. It abounds in many districts of the South of India, and in the Tenasserim provinces.

5. *Falco chicquera.* Not unfrequent. A particularly handsome species as seen alive. The name *Shikra* is bestowed by the Bengalees generally on any small hawk or falcon, though more especially on the female *Astur Dussumieri.*

6. *F. subbuteo.* Visits the neighbourhood of Calcutta during the hyemal months.

7. *F. tinnunculus.* Common.

8. *F. tinnunculoides.* Somewhat rare.

9. *Astur Dussumieri*; *Accipiter Dukhunensis,* Sykes, and *A. scutarius,* Hodgson—the young. Very common. I arrange this bird in *Astur,* as Mr. Gould has arranged the allied Australian species—*A. approximans* and *A. cruentus.*

10. *Accipiter nisosimilis,* Tickell (Journ. As. Soc. Beng. ii. 571); *A. nisus* v. *fringillarius* of Jerdon and others, but distinguished from the European *A. nisus* by its greater size, white superciliary lines, &c. Not common near Calcutta, but very frequent in India generally.

11. *Circus melanoleucos.* Common. Both sexes alike.

12. *C. Swainsonii,* A. Smith; *C. pallidus,* Sykes. Common.

13. *C. Montagui.* Less common than the two preceding species.

14. *C. rufus.* Common.

15. *Circaëtus undulatus*; *Hæmatornis undulatus,* Vigors and Gould. Not common within a few miles of Calcutta, but becomes so at that distance. One or two pairs may frequently be seen hovering over Barrackpore Park.

16. *Spizaëtus niveus*; *Falco niveus,* Tem.; *Nisaëtus Nipalensis,* Hodgson (Journ. As. Soc. Beng. v. 229): not the doubtfully cited *N. niveus,* Jerdon, which is *N. grandis,* Hodgson (*ibid.*): probably *F. caligatus,* Raffles (Lin. Trans. xiii. 278). Common about high jungle, and much resembling *Buteo vulgaris* in its habits. The young have the pure white under parts spotless or nearly so, a dark central streak on each feather increasing at each moult; and I have shot one female (which was paired with a mate of the ordinary colour) that was wholly dusky-black, with an ashy tinge on the back, the irides, as usual, brilliant yellow, and contrasting finely with the blackish plumage.

17. *Haliaëtus Macei*; *H. albipes,* Hodgson, and the young—*H. unicolor,* Hardwicke and Gray. Not uncommon along the river, and descends (as I am informed) occasionally on carrion.

18. *H. Pondicerianus.* A very common and conspicuous species, abundant along the river, and generally observed near water; has a peculiar strange bleating cry. It is amusing to remark the differences of opinion expressed by different observers concerning its systematic station. Thus, Dr. W. Jameson writes—"No person who has ever studied this bird in its native haunts on the Hooghly or the

Ganges, where it occurs in vast numbers, in company with other *Haliaëti*, would for a moment doubt where its proper position ought to be in the ornithological system*:" whilst Mr. Hodgson maintains that—"Those who have classed the *Brahmaní Cheel* of India with the fishing eagles, may be safely said to know as little of the structure as of the habits of that paltry *Milvine* bird ; or else of the group with which they have associated it†." For my part, I much prefer to retain it as an aberrant *Haliaëtus*, the principal difference relating to the comparative size of the feet; and I refer to Mr. Jerdon's excellent description of the habits of this bird ‡, conforming entirely with my observation of it, in corroboration of this view of its affinities, though Mr. Jerdon rather inclines to Mr. Hodgson's opinion on the subject, and even ranks it as an aberrant species of *Milvus*.

19. *Ichthyiaëtus cultrungius*, nobis (Journ. As. Soc. Beng. xi. 110). This bird was described, but not named, by Latham, whose work I have not now to refer to. It is beautifully figured among the drawings of the late Dr. Buchanan Hamilton. The species is not uncommon in the Soonderbuns, but I have obtained only one individual in the vicinity of Calcutta.

20. *Pandion haliaëtus*. The osprey is more or less common in suitable districts throughout India, and is now and then seen near Calcutta. I have obtained one recent specimen.

21. *Milvus Cheele*; *M. govinda*, Sykes. Excessively numerous about human abodes, but rarely, if ever, seen at a distance from them. It is not unusual to see a hundred or more circling in the air together, especially towards the evening, all collected about one spot, though there may be no refuse to entice them thither; or if some garbage be thrown out, their dexterity at clutching whatever they can seize, without alighting, a number of them rapidly following each other and descending thus in the most crowded streets, affords a curious spectacle ; a few will generally alight and mingle among their fellow-scavengers the crows, while a crowd of others are circling and dashing over them, and stooping as they sweep by. In illustration of their boldness, I may mention that I once received a smart knock from the wing of one of these birds in a crowded bazar, as he passed close to my shoulder from behind§. The direct flight of this kite, when not sailing, is heavy and laboured, being relieved at intervals by gliding with motionless wings : numbers may commonly be seen overhead buoyantly floating and gliding in easy curves, yet keeping much together, whether sailing high or low ; and their descent upon any garbage is very rapid, and often spiral. They are decidedly social, and many may daily be seen together sitting on a dead tree, or the parapet of a house, preening or sunning themselves, while others are sailing about above them. Their often-repeated cry

* Calc. Journn. Nat. Hist. i. 318. † Journ. As. Soc. Beng. vi. 368.

‡ Madras Journal of Literature and Science, No. xxiv. 72.

§ With the British kite, *tempora mutantur*. Pennant has shown that these formerly (in Henry the Eighth's time) abounded in the streets of London, and would pick up food from amidst a crowd of people, being protected by law in their useful capacity of scavengers.

is a tremulous shrill squeal (whence the native appellation *Cheele*) resembling that of the British kite. They subsist mainly on filth and refuse, but will readily pick up a chick or wounded bird, and I once knew one to kill a full-grown hen : this, however, was considered rather an anomalous occurrence, and they seem to be generally on excellent terms with the crows ; though I have been told, and on good authority, that a kite will sometimes seize a crow, probably when pressed by hunger, albeit the uproarious clamour of all the crows in the neighbourhood, sure to collect on such an occasion, might suffice to deter him from doing so a second time. During the rainy season the kites totally leave Calcutta for three or four months, not, however, for breeding, for the young have then all flown ; and the Brahminee Cheels (*Hal. Pondicerianus*) in like manner disappear from the river.

22. *Elanus melanopterus.* Not uncommon.

23. *Hyptiopus* (Hodgson, olim *Baza*, H.) *lophotes* ; *Falco lophotes*, Tem. ; *Baza syama*, Hodgson. Rare.

24. *Vultur Pondicerianus.* By no means common. Like its near ally, the South African *V. auricularis**, with which it forms a particular minor group, this species is only seen singly or in pairs—never in flocks. Upon one descending on a carcass, whereon a crowd of the next species are gorging, these all make way for it and keep aloof till it is gone (so, at least, I have repeatedly been informed), whence it currently bears the name of *King Vulture* amongst our countrymen.

25. *V. leuconotus.* The common vulture of India generally, very numerous in the Gangetic Delta.

26. *Neophron percnopterus.* The *Rachamah*, so very abundant in Southern India, is here of rare occurrence. The Society's Museum contains a specimen shot in the neighbourhood ; and I was told that several appeared about the Botanic Garden after the hurricane of the 1st of June last.

27. *Strix flammea* ; *Str. Javanica* of Mr. Jerdon's catalogue. As numerous about Calcutta as in England, and presenting no difference whatever from the British bird.

28. *Ninox lugubris* ; *Strix lugubris*, Tickell (Journ. As. Soc. Beng. ii. 578) ; *Ninox Nipalensis*, Hodgson (Madr. Journ. No. xiv. 23). Tolerably common.

29. *Athene brama* ; *Strix brama*, Temminck ; *Noctua Indica*, Franklin. Common.

30. *Otus brachyotus.* Common during the cool season.

31. *Buceros Malabaricus.* Inhabits the Soonderbuns, and may not unfrequently be purchased alive of the Calcutta dealers.

32. *Upupa epops.* Common in the winter months. In Southern India it is replaced by the smaller and more rufous species—*U. minor* ; but Mr. Jerdon has sent me a specimen from the Neilghierries.

33. *Merops Indicus.* Extremely common, but disappears in the rainy season. It breeds in the neighbourhood, as I have had specimens brought me with eggs ready to lay in the month of March.

* Proc. Zool. Soc. 1833, p. 45.

The general habits of this pretty little green bee-eater are those of a flycatcher, but it frequently hawks for insects on the wing, many together, like swallows.

I have been informed that *M. Phillippinus* may occasionally be shot in the vicinity of Calcutta, but is rare.

34. *Coracias Indica.* Common, but for the most part disappearing at the time of the rains. This roller sits very upright on its perch, with the body-feathers appressed, and those of the head and neck puffy. Its flight is buoyant, but sustained by constant flapping; and I have now and then seen one, or a pair, when seeming about to alight on a tree, make a rapid dive downward to near the ground, then reascend, and perform this manœuvre several times successively as if in play. Its usual note is harsh, but in spring the male utters a very pleasing dissyllabic cry, repeated at intervals.

35. *Eurystomus orientalis.* I have seen a living specimen in the possession of a dealer.

36. *Halcyon Capensis.* Common at all seasons.

37. *H. amauropterus*, Pearson (Journ. As. Soc. Beng. x. 635). Not rare during the cool season, and perhaps also at other times. Is a noisy species, with a much harsher and more grating cry than the last.

38. *H. Smyrnensis.* Common. These three species feed partly on fish and sometimes frogs, but more on crustaceans.

In the Asiatic Society's museum is a specimen closely allied to *H. Smyrnensis*, having the white on the under parts confined to the throat, and the black wing-spot much enlarged, spreading over the shoulder of the wing, which in the typical *Smyrnensis* is rufous-bay. Its native locality is unknown.

39. *Ceryle rudis*; *Ispida bitorquata*, Swainson—the male. Common.

40. *Alcedo Bengalensis.* This closely allied diminutive of the British kingfisher is very abundant.

41. *Bucco cyanops.* Abundant.

42. *B. Phillipensis.* Still more numerous than the preceding species. *B. viridis* (vel *caniceps*) does not appear to inhabit this neighbourhood.

43. *Picus strictus*, Horsfield; *P. sultaneus*, Hodgson; *P. strenuus*? Gould. Rare.

44. *P. Bengalensis.* Extremely common.

45. *P. Nipalensis*; doubtfully cited *P. mentalis* of Mr. Jerdon's catalogue. Rare.

46. *P. badius*, Raffles; *P. rufus*, Hardwicke and Gray. Not common.

47. *P. Macei.* Common.

48. *Yunx torquilla.* The museum contains a specimen that was captured alive in Calcutta.

49. *Cuculus fugax.* Abundant.

50. *C. canorus.* Rare.

51. *C. micropterus.* Rare.

52. *C.* (subgenus *Gymnopus*, nobis) *niger*, Latham. Not uncommon.

53. *Oxylophus edolius.* Not rare.

54. *O. Coromandus.* Rare.

55. *Centropus Phillipensis.* Common.

N.B. For notices of the preceding and other oriental *Cuculidæ*, vide my monograph of the group, published in the Bengal Asiatic Society's Journal, N.S., Nos. 46 and 47.

56. *Caprimulgus Gangeticus*, nobis. Rather common.

57. *C. monticolus*, Franklin. Rare.

58. *C. Asiaticus.* Very common; but all three species found only in the winter months. The females of *C. Asiaticus* have the white spots on the wings and tail as in the other sex.

59. *Cypselus affinis.* Very common, but confined to urban districts, roosting and breeding under the roofs of houses, oftentimes at no great distance from the ground in crowded thoroughfares.

60. *C. palmarum.* A rural species, also very common, and roosting and breeding in the fronds of the fan-leaved palms. Both these swifts are permanently resident throughout the year.

61. *Corvus macrorhynchus*, Wagler; *C. culminatus*, Sykes; *C. corone*, var. Franklin. Chiefly found along the river bank, preying on carrion. This bird is styled *Raven* by Europeans, which has given rise to the current notion that the *C. corax* inhabits the plains of India, which it does not, except partially in the immediate vicinity of the Himalaya.

62. *C. splendens*, Vieillot. The common crow of India. A most abundant, very noisy, familiar, and impudent species, frequenting the vicinity of human abodes, alike in the villages and in the crowded streets of large towns. About the latter they walk and hop like domestic birds, wherever food is to be picked up, just stepping aside out of the way of the passers-by, and regardless of the ordinary throng: but they still retain all the craft and wariness of their tribe, and are ever vigilant, making off on the least suspicious movement, or even on the fixed glance of a stranger: they require but small encouragement, however, to be most troublesomely bold, and do not always wait for such encouragement, peeping into dwelling-rooms, cawing loudly the while, passing through them by different windows, and if opportunity offers, making free with anything that attracts them by the way. Though highly social, this crow is not properly gregarious, like the rook and jackdaw of England; and does not build in society, resembling the *C. corone* in this respect, though, from its commonness, two or three pairs may sometimes resort to the same large tree. Their noise, from the multitude of them, is incessant; and if anything (as the sight of a dead crow) excite them, is most uproarious and annoying. They are about, too, from the earliest dawn till late in the evening, and are far from being quiet on moonlight nights. Eager, busy, and bustling, their flight is always singularly hurried, as if time were a matter of some consequence to them; and, in short, every trait of the crow tribe is prominently developed in this species.

The report of a gun excites a grand commotion among the community of crows; they circle and cross rapidly to and fro overhead, for the most part out of range, cawing lustily, and dodging when the

tube is pointed at them, while others sit observantly on the neighbouring house-tops, &c., all launching on the wing on the next discharge with clamorous outcry, and then, by degrees, returning to their place of observation. Thus, too, they persecute the gunner when in quest of other birds, spreading the alarm in all directions: and I remember, once, when loading beside a large tank, a pair of the fine Caspian tern came and dashed by two or three times within range, but just as I was ready for them a wild crow made his appearance and attacked one of them, being soon joined by others of his fraternity, who speedily drove away the pair of terns without affording me the wished-for chance of a shot. Again, I have seen a crow of this species pounce on a pied harrier (*Circus melanoleucos*) which was standing quietly on the bank of a rivulet, and continue to attack and follow it till both were out of sight. On one occasion I remarked a number of crows and mynabs collected around some horse-droppings on a road, when one of the crows pertinaciously prevented a particular individual mynab from partaking with the rest of the party; again and again did the poor mynab make the attempt, stepping round and approaching from different directions, but all to no purpose, the crow meanwhile paying no attention to the other mynabs of the same species (*Pastor tristis*) which were engaged in picking out the grains. But the most remarkable fact I have observed of this crow was during my short sojourn at Madras, where a party of about twenty were in the daily habit of attending the breakfast of the friend at whose house I was staying, without, however, being allowed to enter the room: among these were two blind, or rather purblind, crows, which could just see their way about, without apparently being able to pick up small articles of food, and these were regularly fed by the rest, first one and then another of which they followed with imploring demeanour and quivering wings, like a nestling, and received the morsels with the same gobbling note of gratulation. They were evidently old birds, and perhaps aged; and it recalled to mind an anecdote related by Levaillant of two barbets (*Bucco*) which that observer found in a compartment of one of the great compound nests of a species of weaver-bird, and which from their helpless state, but good condition, must evidently have been fed by others for some time.

63. *Crypsirina vagabunda*; genus *Dendrocitta*, Gould, *Phrenothrix*, Horsfield. Very common, and the only species of its group found in this neighbourhood. I have never seen it alight on the ground.

64. *Gracula religiosa*; *Eulabes Javanus* (?), Cuvier. The common hill mynab of the shops, but brought from some distance. It does not appear to inhabit the low country.

65. *G. Indicus* (?); *Eulabes Indicus* (?), Cuvier. Smaller than the preceding species, with the bill considerably more slender, the velvety space on the sinciput much reduced in size, and bounded above as well as below by the naked skin. I have obtained a cage-specimen, and seen no other example.

66. *Pastor tristis*. An abundant and very familiar species, being another of the street-birds of Calcutta, though keeping chiefly to

the more open situations: it mingles freely with the crows; and a pair not unfrequently enter my sitting-room, the male treating me with his loud screeching song therein: they breed in nooks of houses, and very commonly in vessels hung out for that purpose by the natives.

67. *Pastor Gingianus* (Bank Mynab). Brought plentifully to the shops from some distance, and breeds in holes in the banks of rivers.

68. *P. cristatellus.* Common, and scarcely less familiar than *P. tristis,* but is never seen in the streets. In Southern India this species is replaced by the nearly allied *P. fuscus,* vel *Mahrattensis* of Sykes.

69. *P. pagodarum* (Brahminee Mynab). Flocks of this species are not unfrequently met with on the arboreal-cotton trees, when in blossom in February; but the shops are not supplied from this neighbourhood.

70. *P. caniceps,* Hodgson. This I take to be the true *Turdus Malabaricus* of Gmelin, which Mr. Jerdon has assigned to a nearly allied species which seems to be confined to the Malabar range and its vicinity, while the present species is generally rare in the Indian peninsula, but abounds in Bengal, Assam and Nepâl. It has a gray head and neck, and rufous breast and belly; while the other has the head, neck and breast silky-white, with also a longer tail. Very common.

71. *P. roseus.* Visits the arboreal-cotton trees in February, like *P. pagodarum*; but the shops are supplied from elsewhere, and this species is not often to be procured in them.

72. *Sturnopastor* (Hodgson) *contra.* A very abundant species, and scarcely less familiar in its habits than *Pastor tristis,* but does not venture into the streets.

73. *Sturnus Indicus,* Hodgson. Differs from *St. vulgaris* in its longer bill, which never becomes yellow at any age. Now and then brought to the shops in considerable numbers, but is not met with in this neighbourhood.

74. *Malacocercus terricolor,* Hodgson. The *Chatorrhœa* of Bengal, not of Southern India. A most abundant and conspicuous species in Bengal and Nepâl, which appears only now to have received a name. It seems also to be the only species found in this part of the country, and is nearly allied to *M. Somervillei,* but Mr. Jerdon considers it as distinct, and I should like to see more specimens of the latter before pronouncing an opinion. See Journ. As. Soc. Beng. x. 650, for a notice of its habits, under its most frequent appellation of *Saat Bhye.*

75. *Timalia* (?) *hypoleuca,* Franklin; *T. Horsfieldi,* Jardine and Selby. I have only procured this species in the shops, where one or two may now and then be met with, which I understand are taken in the neighbourhood. It is certainly a very aberrant *Timalia,* and its form and actions remind one strongly of *Calamophilus biarmicus,* which is so abundantly brought alive to the London markets from Holland.

76. *Orthotomus Bennettii.* The common tailor-bird of India. Extremely common.

77. *Iöra typhia*; *I. scapularis*, Horsfield. A very plentiful species, resident at all seasons.

78. *Turdus* (*Oreocincla*, Gould) *Whitei*. I obtained three specimens in the course of the last cold season.

79. *Geocichla rubecula*. Common in the winter months, and replaced in Southern India by *G. cyanotis*, Jardine and Selby.

80. *Calliope Lathami*. Not rare during the cool season. Is closely allied to *Turdus*.

81. *Copsychus saularis*, Wagler. The *Doyal*. This handsome bird and pleasing songster is tolerably abundant.

82. *C. macrourus*; *Kittacincla macroura*, Gould. The *Shahmour*. Reputed, and probably with truth, to be the finest of oriental songsters. Its notes more resemble those of the blackcap (*Curruca atricapilla*) than any other British bird, but far exceed them in variety and prolongation; besides which the shahmour has a considerable propensity to imitation, and one in my possession has recently learned to give the crow of a cock to perfection, also the notes of the Coël and *Cuculus fugax*, the chatter of a troop of *Saat Bhyes* (no. 74), &c. Many thousands of these elegant birds are kept in cages in Calcutta, and the universal absurd practice is to darken their cages by wrapping them with several folds of cloth, enough to stifle the luckless captives in this climate, though it must be confessed they sing most vigorously while thus circumstanced, but certainly not more so than mine which are exposed to the light and air. It is a practice of the rich natives to employ servants to carry about their shahmours and other birds, and the number of shahmours which are thus borne about the streets of Calcutta is astonishing; the poor birds are shut out from all light and air, like Mahommedan ladies enjoying (!) their evening drive, but they nevertheless (*i. e.* the birds) sing forth most lustily and melodiously, so sweetly as often to arrest the attention of the passer-by. The shahmour is brought from the hilly parts of the country, being never met with in the alluvial tract of Lower Bengal.

83. *Phœnicura atrata*, Jardine and Selby. Not uncommon. This appears to be the only species of Indian true redstart found away from the Himalaya.

84. *Phyllopneuste reguloides*, nobis. Journ. As. Soc. Beng. xi. 191, and since further described by me. Not uncommon in the cool season, and I have obtained one late in March.

85. *Ph. modesta*; *Regulus modestus*, Gould; *R. inornatus*, nobis, Journ. As. Soc. Beng. xi. 191. Tolerably common, and breeds in the vicinity of Calcutta in March, as elsewhere described by me. At this time their plumage is ordinarily much worn, and the mesial pale streak on the crown is in general more or less obliterated. The song-note of this species is somewhat like that of *Ph. sibilatrix*, but much weaker.

86. *Ph. fuscata*, nobis, Journ. As. Soc. Beng. xi. 113. I have not yet obtained a second individual of this well-marked species, which is at once distinguished by its large size and prevalent brown colour.

87. *Ph. affinis*, nobis.

88. *Phyllopneuste lugubris*, nobis. Two nearly allied species, and

the former especially bears a close affinity to the European *Ph. rufa*, but has a different note, and is certainly distinct from it. The other is much darker in colour, particularly on the head, and has an ashy breast*. Both are common.

89. *Acrocephalus turdoides*; *Turdus arundinaceus*, Gmelin; *Sylvia turdoides*, Temm.; *Agrobates brunnescens*, Jerdon. Not uncommon during the cold season.

90. *A. montana*; *Sylvia montana*, Horsfield, apud Jerdon. Tolerably common.

91. *Megalurus toklao*; *Turdus toklao*, Buchanan Hamilton, MS.

92. *Dasyornis striatus*; *Megalurus striatus*, Jerdon; *D. locustelloides*, nobis.

93. *D. colluriceps*, nobis. For notices of these three species, of each of which I have obtained a single live specimen (more or less mutilated) from the bazar shikarees, see Journ. As. Soc. Beng. xi. 602–3.

94. *Curruca hortensis*. I both heard the song and had repeatedly a distinct view of a bird of this species when watching for nobler game with both barrels loaded with heavy shot, so that I did not secure the specimen.

95. *Chaitairis* (Hodgson, olim *Niltava*, H.) *rubeculoides*; *Phœnicura rubeculoides*, Vigors and Gould. Of this I have obtained a single specimen late in March. It is an aberrant member of Mr. Hodgson's very natural genus, and closely allied to *Muscicapa banyumas*, Horsfield (also an Indian bird inhabiting the peninsula), which must therefore be ranged with it.

96. *Dimorpha* (Hodgson, olim *Siphia*, H.) *leucura*; *Muscicapa leucura*, Latham; *Saxicola rubeculoides*, Sykes—the old male. Common in the cool season, and met with at least so late as April. Still it is difficult to procure specimens in fully mature plumage. One only I have obtained with the gular marking on the throat and fore-neck of a deep ferruginous, like the breast of an English robin; another had the same mark paler and less clearly defined; many have a slight tinge of rufous about the chin, but the great majority have no appearance of it.

97. *Culicipeta Burkii*, nobis; *Sylvia Burkii*, Burton, Proc. Zool. Soc. 1835, p. 153. Not uncommon. I should have placed this form next to *Phyllopneuste*, but have not been paying much attention to arrangement in the present catalogue. It is, in fact, a *Phyllopneuste* with a narrow flycatcher's bill, and the usual rictorial *vibrissæ*.

98. *Saxicola rubicola* (?). The plumage of the females renders it doubtful whether this be quite identical with the species of Europe, and Mr. Hodgson I find entertains the same opinion. It is not uncommon in the winter months.

99. *S. caprata*. Occasionally to be met with in the shops of the dealers, but, I believe, not taken in the neighbourhood. It is a pleasing songster.

* From a subsequent letter from Mr. Blyth, we learn that he has since received *Phyllopneuste rufa*, with *Ph. trochilus* and other species from Nepâl, and that the Calcutta *Ph. affinis* is distinct from the former.—Ed.

100. *Cyanecula Suecica.* I have obtained numerous specimens of this bird during the last cold season, but not any in the preceding one. All have the central mark of the breast rufous, and not white.

101. *Muscipeta paradisea* ; *M. Indica,* vel *castanea,* Auct., is the once-moulted bird. By no means rare.

102. *Muscicapa melanops.* Not uncommon during the cool season.

103. *M. cærulea,* Vieillot ; *M. occipitalis,* Vigors ; and the female —*M. cæruleocephala,* Sykes, but not of other authors. Excessively common in the winter months.

104. *Cryptolopha poiocephala.* Of this I have obtained but one specimen during the last cool season.

105. *Rhipidura fuscoventris.* Common at all seasons, and conspicuous both for its activity and the pleasing song-notes of the male.

106. *Pericrocotus princeps* ; genus *Phœnicornis,* Swainson. I obtained a female (one of a pair) during last January.

107. *P. roseus* ; *Muscicapa rosea,* Vieillot. Tolerably common during the cool season.

108. *P. peregrinus.* Common at all seasons.

109. *Graucalus Papuensis* ; *Gr. Nipalensis,* Hodgson. Not rare.

110. *Ceblepyris melaschistos* ; *Volvocivora melaschistos,* Hodgson ; *Graucalus maculosus,* M'Clelland and Horsfield. Moderately common.

111. *C. fimbriatus,* Jerdon, who expresses a suspicion that *C. canus* of Sykes is merely the male. Not rare.

112. *Lanius* —— ? A species very like the young of *L. collurio,* and which does not appear to advance beyond the state of plumage characteristic of the young of its congeners generally, is very common in the cool season.

113. *Tephrodornis superciliaris,* Sw. ; *Lanius Keroula,* Hardwicke and Gray. Common.

114. *T. concolor,* nobis. I obtained a single specimen of a female, noticed as perhaps a variety of the preceding species in Journ. As. Soc. Beng. xi. 799.

115. *Artamus rufiventer.* Common.

116. *Cometes Krishna* ; *Edolius Krishna,* Gould. Tolerably common.

117. *Edolius grandis,* Gould ; *Cometes Malabaroides,* Hodgson.

118. *E. retifer,* Temminck ; *E. Malabaricus,* Gould. Both of these are occasionally to be met with in the shops, the former being a fine songster.

119. *Dicrurus Fingah* ; erroneously ascribed to *balicassius* by authors generally ; *D. albirictus,* Hodgson. A very common and most conspicuous species.

120. *D. macrocercus* ; *D. annectens,* Hodgson. Far from rare.

121. *Melisseus æneus* ; *M. muscipetoides,* Hodgson. Common.

N.B. For a monograph of the Asiatic Drongas, vide J. A. S. B. xi. 799 *et seq.* and note to p. 882.

122. *Ixos Cafer.* Very abundant, and replaced in Southern India by a nearly allied species—*I. pseudocafer,* nobis.

123. *I. jocosus.* Common, but considerably less so than the preceding species.

124. *Pitta brachyura.* I purchased a living specimen of a dealer, which was probably procured at no great distance.

125. *Oriolus Hodsonii* (*Hodgsonii* ?), Swainson; *O. melanocephalus* of India, as distinguished from that of Africa, auctorum. Very common throughout the year.

126. *O. galbula.* I obtained a living specimen of this European species, which I kept for several months in confinement. Its ordinary Indian representative, *O. aureus* (common in the peninsula), I have not yet seen from this part.

[To be continued.]

XIII.—*On the Sacculi of the Polygastrica.* By W. Addison, Esq.

To the Editors of the Annals of Natural History.

Gentlemen,

As Dr. Griffith, in his paper "On the Sacculi of the Polygastrica*," has coupled my name with a very inaccurate interpretation of the effect of the *liquor potassæ* on the *Paramæcium*, allow me to abstract from my 'Experimental Researches' all that I have published on the subject.

"I had often remarked the very great similitude of size and appearance between several of the smaller forms of the Polygastric animalcules and some of the varieties of pus-corpuscles; so great is this similarity, that in many instances it would have been difficult to distinguish the one from the other, had it not been for the voluntary and very active movement of the animalcules. Now *liquor potassæ* produces upon *these* animalcules the same effect as it does on the colourless blood- and pus-corpuscles; it penetrates the transparent integument of the animalcule by imbibition, and causes it to burst open and discharge its contents, which have the same appearance as the molecules and granules from the colourless blood- and pus-corpuscles.

"In the larger forms of the polygastric animalcules there are a great number of large vesicles or cells (which have been called stomachs) very visible in their interior; and these are all discharged from the bodies of the creatures in the same way, when they are submitted to the action of *liquor potassæ*. These so-called stomachs may be seen enlarging in the interior of the animalcule prior to the rupture of the external integument; and when they are discharged from the body of the animalcule, numerous minute molecules may be seen within them†." In the former of these paragraphs it is evident that I am speaking of animalcules ten or twenty times less than the *Paramæcium*; and in the latter, when

* In the June Number, p. 438.

† Experimental Researches on Inflammation, and on the origin and nature of Tubercles of the Lungs. Churchill, 1843.

I speak of the vesicles or cells being discharged "in the same way," it is evident that I refer to the bursting, and not to imbibition.

Now with regard to 'imbibition,' no physical reasoning about the density of fluids can have any weight in determining what living structures can or cannot do; or if it had, it would be, I presume, equally cogent as regards the colourless blood-corpuscles, or the pollen grain, both of which swell and burst when submitted to the action of *liquor potassæ*. If the *Paramæcium aurelia* be subjected to the action of a dilute solution of the alkali, in the proportion of half a drachm (Brandish's alkali) to an ounce and a half or two ounces of water, it immediately commences a laboured, rotatory, wriggling motion through the liquid, and in many of the individuals two remarkable vesicles will be seen tensely distended in the interior of the animalcule, very frequently accompanied with three, four or five perfectly transparent large circular globules, projecting from the body of the creature (Fig. 1.). After a short period the contents of the body may be seen discharging themselves into one or more of these transparent projections, while the body itself, or rather the integument of the body, may be seen to shrivel up, the motionless cilia fringing its circumference remaining very visible (Fig. 2.).

Fig. 1.

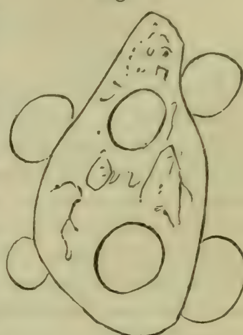
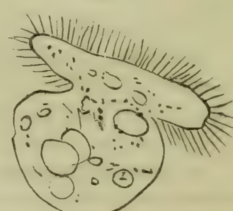


Fig. 2.



Now the appearance of these transparent globular projections, which can be formed in no other way than by the separation and distension of the thin and outermost portion of the integument (the cuticle as it were), and the persistence of the delicate cilia when immersed in the alkaline liquid, are surely quite incompatible with the idea of a solution of the integument: this must be an 'inaccurate interpretation' of the appearances, the whole of which are indeed well worthy the observation of those who attend to the animalcules.

I remain, Gentlemen, your obedient servant,

William Addison.

Great Malvern, July 16th, 1843.

XIV.—*Descriptions of some new species of* Chalcidites. By Francis Walker, Esq., F.L.S.

Isosoma Hordei (Harris MSS.), Mas. *Atrum, antennæ nigræ, pedes fulvi, femora piceo-vittata, tarsi flavi, alæ limpidæ.*

Corpus atrum, convexum, angustum, sublineare, parum nitens, scite punctatum, parce hirtum: caput transversum, breve, thorace vix latius; vertex latus; frons impressa, abrupte declivis: oculi picei, mediocres, non extantes: antennæ nigræ, pubescentes, filiformes, graciles, corpore breviores: thorax fusiformis: prothorax magnus, transversus: mesothoracis scutum longitudine latius; parapsidum suturæ bene determinatæ, postice approximatæ; scutellum subconicum: metathorax sat magnus, declivis, obconicus: petiolus sat longus: abdomen sublineare, nitens, læve, thorace brevius; segmenta 1^{um} et 2^{um} magna: pedes fulvi, simplices, subæquales; coxæ nigræ; femora piceo-vittata; tarsi flavi, apice fusci: alæ limpidæ; squamulæ piceæ; nervi fulvi; nervus humeralis ulnari duplo longior, radialis ulnari multo brevior cubitali vix longior, cubitalis sat longus; stigma minutum. (Corp. long. lin. $1\frac{1}{4}$; alar. lin. 2.)

Parasitic on a species of *Cecidomyia*. Presented to me by Dr. Harris of Philadelphia.

Isosoma Laothoe, Fem. *Atrum, prothoraci maculis genubusque flavis, tarsis piceis, alis limpidis, nervis fulvis.*

Atrum, convexum, punctatum, parce pubescens, parum nitens: caput thorace vix latius: oculi et ocelli picei: antennæ graciles, extrorsum crassiores, thorace paullo breviores: prothorax mesothorace angustior utrinque flavo-maculatus: mesothoracis parapsides extantes, suturæ optime determinatæ; scutellum parvum: metathorax declivis, convexus, carinatus: petiolus brevis: abdomen fusiforme, nitens, læve, glabrum, apice acuminatum, thorace vix longius; segmenta 1^{um} et 2^{um} parva; 3^{um} et 4^{um} longiora; 5^{um} et 6^{um} breviora: pedes nigri; genua flava; tarsi picei: alæ limpidæ; squamulæ piceæ; nervi fulvi. (Corp. long. lin. 1; alar. lin. $1\frac{1}{2}$.)

Taken by Dr. Greville at Juniper Green near Edinburgh.

Perilampus Entellus, Mas. *Viridis, antennæ piceæ, pedes virides fulvo-cincti, tarsi fulvi, alæ limpidæ.* Fem. *Cyaneus, antennæ nigræ.*

Mas. Corpus breve, crassum, convexum, viride, nitens, rude punctatum, parce hirtum: caput transversum, breve, thoracis latitudine; vertex latus, æneo-varius; frons cyanea, impressa, fere lævis, abrupte declivis: oculi rufi, mediocres, non extantes: antennæ piceæ, longifusiformes, thorace paullo breviores; articuli valde approximati; 1^{us} longus, gracilis, cyaneus: thorax ovatus: prothorax transversus, brevis: mesothoracis scutum longitudine latius; parapsidum suturæ non bene determinatæ, postice approximatæ; scutellum magnum, obconicum, apice elevatum, metathoracem fere obtegens: metathorax transversus, abrupte declivis, postice angustus: petiolus brevissimus: abdomen læve, contractum, latitudine vix longius; segmenta 1^{um} et 2^{um} maxima: pedes virides, pubescentes, simplices, subæquales; trochanteres fulvi; genua fulva; tibiæ apice fulvæ; tarsi fulvi, apice fusci: alæ limpidæ; squamulæ piceæ; nervi fusci; nervus humeralis ulnari plus duplo longior, radialis ulnari paullo brevior cubitali multo longior, cubitalis brevis; stigma minutum.

Fem. Corpus cyaneum: antennæ nigræ: pedes cyaneo-varii. (Corp. long. lin. $1\frac{3}{4}$—2; alar. lin. 3—$3\frac{1}{4}$.)

Var. β. Mas. Tarsi flavi, apice fusci.

Var. γ. Fem. Corpus purpureo-varium.

Found by R. Forster, Esq. in Ohio.

Callimome Æa, Fem. *Cyaneus, antennæ nigræ, pedes cyanei fulvo-cincti, tarsi flavi, alæ limpidæ.*

Corpus sublineare, convexum, cyaneum, nitens, scitissime squameum, parce hirtum: caput transversum, breve, thoracis latitudine; vertex sat latus; frons impressa, abrupte declivis: oculi rufi, mediocres, non extantes: antennæ nigræ, extrorsum crassiores, media fronte insertæ, thorace paullo breviores; articulus 1^{us} longus, gracilis, fulvus; 2^{us} cyathiformis; 3^{us} et 4^{us} minimi; 5^{us} et sequentes breves, approximati; clava conica, articulo $10°$ longior: thorax longiovatus: prothorax conicus, mediocris: mesothoracis scutum longitudine non latius; parapsidum suturæ bene determinatæ, postice approximatæ; scutellum subconicum: metathorax mediocris, declivis, obconicus: petiolus brevis: abdomen longiovatum, læve, compressum, profunde carinatum, thorace non longius; segmentum 1^{um} magnum: oviductus exsertus; vaginæ nigræ, abdomine longiores: pedes cyanei, simplices, subæquales; trochanteres picei; genua fulva; tibiæ apice fulvæ; tarsi flavi, apice fusci; protibiæ fulvæ: alæ limpidæ; squamulæ piceæ; nervi picei; nervus humeralis ulnari multo longior, radialis ulnari brevior, cubitalis brevissimus; stigma minutum. (Corp. long. lin. 2; alar. lin. 2.)

Taken by E. Doubleday, Esq. near New York.

Trichogramma Carina. *Niger, antennæ fuscæ, pedes picei, alæ limpidæ.*

Corpus nigrum, breve, depressum, nitens, læve, parce hirtum: caput transversum, brevissimum, impressum, thoracis latitudine; vertex sat latus; frons abrupte declivis: oculi picei, mediocres, non extantes: antennæ fuscæ, hirtæ, fusiformes, thorace longiores; articulus 1^{us} longus, gracilis, fusiformis; 2^{us} cyathiformis; 3^{us} et sequentes ad 7^{um} clavam fingentes fusiformem: thorax ovatus: prothorax transversus, supra non conspicuus: mesothoracis scutum longitudine latius; parapsidum suturæ non bene determinatæ; scutellum parvum: metathorax brevissimus: petiolus nullus: abdomen sublineare, thorace paullo longius vix angustius: pedes picei, simplices, subæquales: alæ limpidæ; proalæ latissimæ; squamulæ piceæ; nervi fusci, costæ dimidii vix longitudine. (Corp. long. lin. $\frac{1}{4}$; alar. lin. $\frac{1}{2}$.)

July: Forest of Fontainbleau.

XV.—*On the* Diatomaceæ. By John Ralfs, Esq., M.R.C.S., Penzance*.

[With Plates.]

[Continued from vol. xi. p. 457.]

Tessella, *Eh.*

Filaments free; frustules irregularly separating and adhering by the angles, striated.

Striatella, Tabellaria, Tetracyclus and this genus form a distinct group of the *Cymbelleæ,* distinguished from the other genera by having striæ on the central portion of the frustule. *Tessella* differs from *Striatella,* as its filaments are not attached†; from *Tetracyclus,* as its frustules here and there cohere at their angles; and from *Tabellaria,* as its striæ are not interrupted in the centre.

1. *T. catena,* Eh. Frustules with several longitudinal series of short

* Read before the Botanical Society of Edinburgh.

† "Sæpe implexum nec affixum."—Ehrenberg, Die Inf. p. 201.

transverse striæ; lateral surfaces striated, contracted near the ends. Ehrenberg, Die Infus. p. 202. t. 20. f. 7; Pritch. Infus. p. 219. f. 180—182. *Fragilaria striatula*, Ag. Syst. p. 7; Kutz. in Linnæa 1833, p. 73; Grev. in Br. Fl. vol. ii. p. 403! *F. Carmichaelii*, Harv. Br. Alg. p. 198. *Grammonema striatula*, Ag. Consp. Diatom. p. 63.

"Appin, *Capt. Carmichael*;" Southampton, *Miss Hill*; co. Antrim, Ireland, *Mr. W. Thompson*.

I have drawn up my description of this plant from one of Capt. Carmichael's specimens given me by Mr. Harvey.

At first sight this plant bears so great a resemblance to *Striatella arcuata* as to appear merely a variety of it; and without taking into consideration the lateral form, it would be difficult to find a good distinguishing character.

From my specimens I was unable to ascertain whether the filaments were attached or not; they are fragile, and here and there cohere at their angles in the same manner as *Striatella arcuata*. The frustules are generally not so broad in proportion to their length as those of *Striatella arcuata*, but, like them, have numerous series of transverse striæ, which however in this plant are not so strongly marked, and under a low power especially are less evident than the marginal striæ.

The lateral surfaces are swollen in the centre and constricted near the ends, with numerous transverse striæ along their whole length.

P.S. Since the above description was written, I have gathered this plant on the muddy sides of rocks in Swansea Bay.

The filaments are more slender than in the Appin specimen, of a dirty-brown colour, much curled and entangled, and but slightly fragile.

In drying it adheres much more firmly to paper than does the *Striatella arcuata*, is less fragile, does not turn green in drying, and has no gloss.

Plate II. fig. 1. *a*, *Tessella catena*; *b*, lateral view; *c*, lateral view with the septa removed.

Tetracyclus, n. g.

Filaments free, fragile, four-sided, each side rounded and forming the segment of a distinct circle; frustules longitudinally striated.

1. *T. lacustris*. Frustules about twice as broad as long; lateral surfaces with from seven to nine distinct transverse striæ.

Llyn Prefeddyr near Barmouth, the *Rev. T. Salwey*; pool near Dolgelley*.

In August last this plant was sent to me by Mr. Salwey, who found it sparingly among *Fragilaria hyemalis* in the above lake.

* I have this year met with it in two or three pools near Dolgelley.—J. R.

I afterwards gathered a specimen of the same *Fragilaria* near Dolgelley, with which a few of the frustules were intermixed.

I was at first inclined to refer this plant to Ehrenberg's genus *Tessella*, but more minute examination convinced me that it could not be placed there. The frustules are striated as in *Striatella* and *Tessella*, but it differs from the former genus in not being attached, and from both, as the frustules do not cohere at the angles forming a chain. In the curious form of the filament it differs equally from these genera and all the other *Diatomaceæ*, except perhaps *Tabellaria*, in which the inflated canal produces a distant resemblance.

Filaments attenuated, four-sided; the sides are all rounded: hence, when either of the sides is examined by the microscope, portions of two others are also seen like a border, and the outlines of that under examination appear like two lines running down the filament. But the opposite sides only are alike. Two of them are in fact the margins of the filament, and may be distinguished from the other two by a slight contraction of the filament at the junction of the frustules on the front and back, by the absence of puncta at that part, and by their striæ being more distinct. When the front and back are viewed under the microscope, there is no contraction of the filament at the junction of the frustules, and the ends of the lateral striæ exhibit puncta along the margin.

In this view larger portions of the older surfaces are seen, and hence the filament appears to have a broader border, in which the striæ are more distinct than in the centre.

The endochrome is of a dark green colour, and is often collected into an irregular spot.

The lateral surfaces resemble in outline the flower of a *Veronica*, or the *quatrefoil of a gothic window*; their length and breadth in the smaller frustules are nearly equal, but in the larger ones they are $1\frac{1}{2}$ as long as broad. They have about seven rather distant, well-marked transverse striæ.

Plate II. fig. 2. *a*, *Tetracyclus lacustris*; *b*, marginal view; *c*, lateral views; *d*, lateral views, showing its internal plates.

Fragilaria, *Lyngb.* (*Eh.*)

Filaments free, fragile; frustules rectangular, without striæ on the central portion.

This genus is nearly allied to *Diatoma*; the chief distinction between them is, that in *Diatoma* the frustules cohere at the angles, and in *Fragilaria* do not. Even this distinction is not always present in one species of *Fragilaria*, which seems therefore intermediate.

The filaments are free, generally attenuated and fragile; the

frustules are mostly longer than broad, with two puncta at each end, and without striæ on the central portion.

The young frustules are often nearly equal in length and breadth, but as they afterwards increase in length a good specific distinction cannot be founded on these characters, especially as the filaments are attenuated.

I have frequently examined the puncta so generally present at the ends of the frustules in this and other genera of the *Cymbelleæ,* but I have never found any reason to believe that they are openings, as many naturalists have supposed. Mr. Borrer informs me that in *Fragilaria pectinalis* they are the terminations of slight grooves.

At present I shall describe only the freshwater species, and defer the consideration of the marine species, *diatomoides* and *aurea,* until I have more fully examined them.

1. *F. pectinalis,* Lyngb. Frustules broad, with two evident puncta at each end ; lateral surfaces striated, curved, constricted on one side near the end. Ag. Syst. p. 7 ; Consp. Diat. p. 62 ; Grev. in Br. Fl. vol. ii. p. 403 ; Harv. Br. Alg. p. 197. *Conferva pectinalis,* Dill. t. 24 ; E. Bot. t. 1611 ! ; Jurg. Dec. 18. no. 12 !. *Frag. grandis,* Eh. Die Infus. p. 203. t. 15. fig. 11 ; Pritch. Infus. p. 220. *β. undulata,* fig. 171.

In freshwater pools and ditches ; often abundant. Hurst, Sussex, *Mr. Borrer* ; Lewes and Tunbridge Wells, *Mr. Jenner* ; Cheshunt, Herts, *Mr. Hassall* ; Barmouth, N. Wales, the *Rev. T. Salwey* ; Aberdeen, *Dr. Dickie*; Ballantrae, Ayrshire, *Mr. Thompson* ; Stevenston, *Rev. D. Landsborough* ; Ireland, *Mr. D. Moore.* Dolgelley, Penzance, Ilfracombe, &c.

β. Drws Ardudwy near Barmouth, the *Rev. T. Salwey.*

This plant is brown when recent, but when dried becomes of a pale grayish green colour with a glass-like lustre.

The frustules are larger in this than in any of the following species. They are broad but vary in length, being from three to five times longer than broad, and generally have the striæ clearly visible at their junction. The endochrome is commonly contracted into two irregular lines, which are not unfrequently united in the centre ; but often it is in four patches, apparently from the division of these lines. The frustules sometimes have a central pellucid spot, which does not appear to be connected with the endochrome.

I have several times met with a remarkable state of this species, and have also received it from Mr. Jenner. Within the frustule there is apparently another siliceous frustule, the lateral margins of which are rounded, having striæ like the outer frustule. In the longer frustules it is nearly elliptic, but in the shorter ones appears as if truncated at the ends, and in both it occupies the whole

interior of the frustule except the corners, where the puncta at the ends are situated; it is filled with a yellowish granular mass, mixed with numerous colourless vesicles (Pl. II. fig. 3. *b*).

The lateral surfaces are very characteristic, and will distinguish this from all the following species. One margin is flat, or slightly concave; the other is convex, and slopes off rather abruptly near the ends, where also it is slightly constricted. Besides these constrictions, indications of two others may often be observed on the convex margin; but in a specimen sent me by Mr. Salwey these are so strongly marked, that if I had not seen intermediate forms, I should have supposed it to belong to a distinct species. I have made it *var. β. undulata*, which perfectly agrees with the usual state of the species, except in the lateral view, the convex margin of which has two indentations, giving it an undulated appearance; the other margin is flat, with a projection in the centre. In both forms the lateral surfaces are marked with close transverse striæ.

Mr. Dalrymple, whose experience and knowledge of these tribes gives great weight to his opinion, informs me that this species is unquestionably the *Fragil. grandis* of Ehrenberg. It agrees very well in most respects with Ehrenberg's description and figures except as to the lateral surfaces, which he has described and figured as lanceolate with obtuse ends, a form differing widely from our plant. Mr. Dalrymple, however, observes, that Ehrenberg has one figure striated and another not so, although equally large, and hence he supposes that the junction surfaces may have been figured from a different species, which is represented in the non-striated figure. But whether this plant be Ehrenberg's *Fragilaria grandis* or not, I have no doubt that he is in error regarding the species which he has named *Fragilaria pectinalis*. His mistake was pointed out to me by Mr. Borrer, who at the same time sent me a specimen of the *Conferva pectinalis* of 'English Botany,' which is the present plant. I am also enabled, through the kindness of Mr. Berkeley, to refer Jurgens's plant also to this species.

Plate II. fig. 3. *a*, various states of *F. pectinalis*; *b*, frustules deprived of their colouring matter; *c*, lateral view; *d*, lateral view of variety *β*.

2. *F. rhabdosoma*, Eh. Frustules narrow; puncta wanting or indistinct; lateral surfaces narrow-lanceolate, without striæ. Eh. Die Infus. p. 204. t. 15. f. 12; Pritch. Infus. p. 221. f. 173. *Frag. pectinalis*, Kutz. in Linnæa 1833, p. 73? *Frag. tenuis*, Ag. Consp. Diatom. p. 63?

In freshwater pools, &c.; common, but generally in small quantities, and mixed with other *Diatomaceæ*. Sussex, *Mr. Borrer*; Tunbridge Wells, *Mr. Jenner*; Cheshunt, *Mr. Hassall*; Barmouth, *Rev. T. Salwey*; Portmore Lough, Ireland, *Mr. D. Moore*; Stevenston, Ayrshire, *Rev. D. Landsborough*. Dolgelley, Ilfracombe, Penzance.

Plant pale brown when recent; in drying becomes grayish, often with a silvery lustre.

Filaments attenuated; endochrome consisting of rather large granules arranged in a central line running down the filament; frustules very narrow, many times longer than broad; puncta indistinct or wanting.

Ehrenberg describes the lateral surfaces as acicular with the ends acute: they are so narrow that I have not succeeded in obtaining a satisfactory view of them; but they appear to be narrow-lanceolate, without striæ, constricted near the ends, which are somewhat obtuse.

This species is probably often passed over as a state of *F. pectinalis*; but the narrow frustules, the absence of striæ, and the form of the lateral surfaces sufficiently distinguish it. Mr. D. Moore, who obligingly favoured me with drawings and remarks on many of the minute Irish Algæ, has figured and described this species as distinct from *F. pectinalis*; he also observed that it is less fragile than that plant.

I have placed the reference to Kutzing under this species rather than under *F. pectinalis*, because he says, "siccitate argentescente," a character far more applicable to this plant.

Plate II. fig. 4. *a*, *F. rhabdosoma*; *b*, frustule, deprived of its endochrome; *c*, frustule, lateral view.

3. *F. hyemalis*, Lyngb. Frustules broad; puncta at the ends very minute; lateral surfaces elliptic-lanceolate, with well-marked striæ, which terminate in distinct puncta along the margins. Lyngb. t. 63; Ag. Syst. p. 7; Consp. Diatom. p. 63; Kutz. in Linnæa 1833, p. 72. *F. confervoides*, Grev. in Br. Fl. vol. ii. p. 403!; Harv. Br. Alg. p. 197.

In freshwater pools and rivulets. Sussex, *Mr. Borrer*; Llyn Prefeddyr near Barmouth, *Rev. T. Salwey*; Aberdeen, *Dr. Dickie*; Stevenston, *Rev. D. Landsborough*; Ballantrae, Ayrshire, *Mr. W. Thompson*; Carnlough co. Antrim, and bog-holes co. Wicklow, *Mr. D. Moore*. Dolgelley; Tavistock and Trentishoe, Devonshire; Penzance.

Brownish when recent, whitish brown when dry.

Filaments elongated, attenuated, very fragile, separating into single frustules almost immediately after being gathered. At first the frustules are as broad as long, but when mature they are generally two or three (occasionally five or six) times longer than broad; the puncta at the ends are more minute than in *F. pectinalis* and *F. confervoides*, and along the lateral margins are distinct rather distant puncta, which are the terminations of the lateral striæ. The lateral surfaces are broad, with well-marked transverse striæ. In the smaller frustules there are only two or three striæ situated near the middle; they afterwards become

more numerous, and are then generally from six to nine in number, but they are never present towards the ends. This may always be easily distinguished from the other species by the distinct striæ, and by their terminations forming puncta along the margins.

When young the frustules are filled with a minutely granular fluid, but this is soon condensed into a few large granules, and the rest of the frustule becomes nearly hyaline.

There are generally about eight or ten granules which are large, and sometimes collected into a central mass, but more usually arranged in one or two rows.

When the filaments of *Diatoma vulgare* are broken up into single frustules, they greatly resemble those of *F. hyemalis,* but in the latter the puncta at the ends of the frustules are more minute; the striæ of the lateral surfaces do not appear to encroach upon the front surface, and the puncta along the lateral margins are more distant, fewer, and more distinctly marked. *Diatoma vulgare* also turns green in drying, whilst this plant remains of a brownish colour.

Plate II. fig. 5. *a*, states of *F. hyemalis*; *b*, single frustule; *c*, frustule, deprived of its endochrome; *d*, views of the lateral surfaces.

4. *F. virescens.* Frustules broad, with two evident puncta at each end; lateral surfaces turgid-lanceolate, constricted near the ends; striæ none, or indistinct. *Frag. pectinalis,* Ehrenb. Die Infus. p. 206. t. 16. fig. 1; Pritch. Infus. p. 222. fig. 176.

In freshwater pools. Cold Bath, Tunbridge Wells, *Mr. Jenner.* Madron and Chyanhâl Moor near Penzance.

Plant green, not much altered in drying: when verging to decay it is occasionally found of a brown colour.

Filaments elongated, attenuated, less fragile than the preceding species. The frustules frequently separate and cohere by the angles in a zigzag chain, from which circumstance it is doubtful whether the plant is rightly placed in this genus. They are often nearly square, but more frequently they are three or four, and sometimes five or six times longer than broad. The endochrome is greenish, and consists of numerous small granules, either scattered or collected together in the centre of the frustule. The lateral surfaces are rather broad, somewhat lanceolate, but constricted near the ends, which are obtuse.

When the frustules adhere by their angles, this plant bears a considerable resemblance to young specimens of *Diatoma vulgare,* from which however it may be distinguished by its green colour when recent, by the form of the lateral surfaces, and by the apparent absence of striæ under a moderate power of the microscope. In one or other of these respects it differs from any of the preceding species.

As this is the only species with which I am acquainted of a green colour in its growing state, I was at first inclined to consider it the *Fragilaria confervoides* of Greville; but I have lately received from Mr. Harvey an authentic specimen of that plant, which I have ascertained to be *Fragilaria hyemalis*, Lyngb.

Ehrenberg describes his *Frag. pectinalis* as striated. I have never succeeded in detecting the slightest appearance of striæ on the lateral surfaces, although I have repeatedly and carefully examined them; nor did Mr. Berkeley, to whom I sent specimens, perceive them. On the other hand, Mr. Dalrymple observes, that the striæ, though difficult to see, are nevertheless present. Mr. Jenner, who is a very accurate observer, thinks that there are very faint, almost obsolete striæ, which can be only seen when the endochrome is removed: in another letter, however, he enumerates the absence of striæ among the characters of the species. Thus it will be seen, that even if striæ are present in this plant, they cannot be adopted as one of its characters without the risk of misleading the observer.

Plate II. fig. 6. *a*, states of *F. virescens*; *b*, frustules, deprived of their endochrome; *c*, lateral view.

Analysis.

1.	The margins of the lateral surfaces flat or concave on one side, and on the other convex	*pectinalis.*
	The margins of the lateral surfaces convex and similar on both sides	2
2.	Lateral margins with distinct evident puncta	*hyemalis.*
	Lateral margins without puncta	3
3.	Frustules very narrow, the puncta at their ends indistinct or wanting	*rhabdosoma.*
	Frustules rather broad, with two evident puncta at each end	*virescens.*

[To be continued.]

XVI.—*Considerations on the tribe of the* Podaxineæ, *and description of the new genus* Gyrophragmium. By M. Montagne*.

Amongst the Trichogastrous Fungi there is a small tribe which has recently been raised to the rank of a family by M. Corda, and which is remarkable among other characters by the presence of a columella traversing the axis of the *peridium*: it is the *Podaxineæ.* This tribe, which was formerly composed of the three genera *Cycloderma*, Klotzsch, *Cauloglossum*, Greville, and *Podaxon*, Desvaux, became all at once doubled by the addition of three others, the *Secotium*, Kunze, the *Polyplocium*, Berkeley, and the *Gyrophragmium*, nob., which forms the principal object of this notice.

* From an extract by the Author in the 'Comptes Rendus,' No. 16, 1843.

Gyrophragmium results from the dismembering of the genus *Montagnea,* founded by Fries, ' Genera Hymenomycetum,' p. 7, on two fungi which grow on the shores of Maguelone, in the environs of Montpelier, one of which had received the name of *Agaricus arenarius* from M. DeCandolle, the other that of *Agaricus ocreatus* from M. Delile. The continued study which I have made of the second of these species, subsequently found near Bona and brought in all stages of evolution by Captain Durieu, Member of the African Commission, has proved to me that these two fungi, although similar and apparently related, do not belong to the same family. A very young individual of *Gyrophragmium Dunalii* showed indeed in the clearest manner, that what had been taken for the pileus of an Agaric was the superior half of a *peridium,* the inferior half of which is represented by an ample *volva* surrounding the stem, and that the supposed leaflets or lamellæ were only processes, or rather partitions emanating from all the points of the pileiform portion of the *peridium.* The following are the characters upon which this curious genus is established:—

Receptaculum stipatum. Peridium primo turbinatum, dein medio orbiculatim ruptum superne pileiforme cum stipite centrali ad apicem usque producto, volva ampla (quæ nihil aliud nisi pars peridii inferior) instructo continuum. Capillitium in dissepimenta contextum lamelliformia subparallela e peridii toto hemisphærio descendentia, a stipite distantia, in plano ramosa, non autem anastomosantia, sinuosa, plicato-crispata adeoque densata ut sibi cohærere videantur, primo lenta olivacea, tandem exarescentia fragilissima, nigra, subtus libera, labyrinthiformia. Flocci liberi nulli. Sporæ globosæ, pedicellatæ, dissepimentis affixæ. Contextus peridii stipitisque fibrosus in dissepimenta continuatus. Fungi arescentes, persistentes, habitu *Agarico* vel *Boleto* similes, specie volvati aut annulati, stipitati, in arenosis maritimis *Africæ* borealis et *Galliæ* australis hucusque obvii.

The genus *Gyrophragmium* differs from *Polyplocium,* Berk., on the one hand by the form and the rigidity of its partitions, and on the other by the absence of free filaments intermixed with the sporules, filaments which are found in the latter genus. Just as in *Secotium* its sporules are fixed by a short pedicel to the walls of the compartments, but these compartments, which are free in *Gyrophragmium,* form a spongy tissue in the other genus by their frequent anastomoses.

Considered according to the degree of their structure, the genera of the tribe *Podaxineæ* may be arranged as follows: *Caloglossum, Cycloderma, Podaxon, Secotium, Polyplocium* and *Gyrophragmium.* As *Secotium* is the form of transition from *Podaxon* to *Polyplocium,* so the latter evidently constitutes a passage between the first of these genera and *Gyrophragmium.* I have

every reason to suppose that one day, when we are better acquainted with the history of its development, of which we are entirely ignorant at present, the genus* *Montagnea* itself will have to be placed at the head of this tribe, from which *Batarrea* is probably not so far removed as is supposed.

XVII.—*On the different modes of preserving Microscopic Objects.* By John Wm. Griffith, M.D., F.L.S. &c.

During the progress of microscopic experiments and examinations, we are continually meeting with parts in which some peculiar structure is particularly well illustrated, which we are anxious to preserve; sometimes, for the purpose of reference and comparison, we are obliged to keep specimens of different structures by us. It is my intention here to say a few words on the best methods of so doing.

The description of these is no slight task, for it is by no means easy to render a clear account of the manipulations required, so as to make them applicable by others; moreover, one in the habit of continually putting up specimens is apt to overlook mentioning certain minutiæ, which, from use, he is hardly aware of performing, but which are essential to the perfection of the work. The main point is to protect the object from injury by surrounding influences, such as violence, the action of the preservative liquids, evaporation, &c. This in a few cases is impossible, but in the majority any alterations produced in those specimens which are properly put up are so slight as not to destroy their value. There are two modes of viewing microscopic objects; one when illuminated by reflected, the other by transmitted light. I shall first notice the former.

Opake objects are of two kinds; those preserved in the dry, and those in the moist state. *α.* The dry ones are usually fastened upon circular discs, or columns of cork, by a little gum, or solution of gum mixed with isinglass; they are then transfixed with fine pins, so as to be stuck into cork, which forms the bottom of the drawer in which they are arranged. Sometimes the circular flat discs of cork are fastened upon glass slips, and arranged in cabinets in the same manner as transparent objects. The cork must always be blackened, so as to prevent the reflection of any luminous rays which might interfere with the distinct vision of the object. This is effected in cork either by scorching or painting it over with an intimate mixture of finely powdered lamp-black and gum-water. But almost any black surfaces may be used for this purpose—black velvet, silk, paper, or blackened metal. When the opake object is

* M. Montagne has very lately received valuable information on this genus from M. Dunal, which he will no doubt shortly publish. From the observations of Dunal, it appears that all the specimens hitherto collected have been imperfect. We are happy to hear that M. Dunal, whose letter and sketches we have had the advantage of inspecting, is using every exertion to procure this most curious and interesting production in every stage of growth.—Ed.

illuminated (and which is the best way) by the condensation of light by a plano-convex or other lens, the size of the cork or other support for the object is of no consequence. But when the light is first reflected by the mirror and subsequently condensed by a second concave metallic mirror or cup, of course the smaller the object-holder is, the better, because it allows a larger number of rays to be condensed and to illuminate the object more perfectly.

β. Those which, although viewed as opake objects, are yet preserved liquid, are kept in cells, which will be presently described; many animal preparations, injections, &c. are best preserved in this manner.

Transparent objects.—Different methods from those usually adopted were formerly made use of to prepare these. They were laid upon slides of various kinds, ivory, wood, or glass. The ivory ones (which are scarcely ever now used), of various sizes, had circular apertures turned in them at regular distances; in these holes small discs of talc were laid; they were prevented from falling through these holes by an elevated rim left at one end, so that the aperture was larger at one end than at the other; on the other side they were prevented from escaping by the pressure of a small brass ring (cut from off a spiral coil). These, as I have said, are now rarely used, on account of the expense of the turned ivory, the difficulty in arranging the objects nicely, as well as the obvious objections to the talc. The wooden ones are abandoned for nearly the same reasons.

They are now generally made of glass. A number of oblong glass slips of the same size* are usually kept already cut, and washed clean with soap and water to free them from grease, &c. Many vegetable preparations can be beautifully preserved by placing them between two of these glass slips, next tying the latter together towards each end by a turn or two of cotton or fine string, then keeping them immersed in a wide-mouthed stoppered bottle containing spirits of wine and water. Those only are well kept thus which are used with low powers of the microscope. When required to be examined they are taken out, drained and wiped; enough spirit usually remains between the glasses by capillarity to insure their transparency.

To preserve transparent objects dry, if low powers only be used, they may be laid between two of the above-mentioned slips, allowed perfectly to dry (if previously moist), and the whole slide covered with a doubled piece of pasted coloured paper, excepting two circular or other shaped apertures corresponding to the site of the objects.

In some cases where the objects are not quite so transparent as we should wish—in, I may say, all cases of the preservation of crystalline bodies, particularly when for examination by polarized light—they may be immersed in Canada balsam. For low powers take two glass slips, having heated one gently over the spirit-lamp (at a great distance however); place upon it a small quantity of Canada balsam from the end of a piece of stick. Let this perfectly, but slowly,

* This varies according to the whim of different observers, but the thickness is best about that of ordinary window glass.

melt and diffuse itself over the glass ; now lay in its centre the object ; if necessary, drop a small quantity more of the balsam upon it, and then lay the other previously warmed glass slide upon the first ; gently press them together : should any balsam exude at the edges of the glass plates, remove this by a slip of card ; allow the balsam to solidify ; the whole is then completed. Should any of the balsam have escaped upon or smeared the surfaces of the glass so as to destroy the transparency of the object, a little oil well rubbed in will remove it ; alcohol will produce the same effect, but it is apt to act upon the balsam between the glasses and injure the specimen, which oil does not. I may remark here, that the longer the balsam is heated over the lamp or candle, the sooner it solidifies after removal from it. I generally therefore continue to heat the balsam, so that there is no fear of the glass slips moving upon one another so as to injure the object. But it requires great care to avoid the extrication of air-bubbles. In many cases it is convenient to fasten the two ends of the glass slips together whilst the balsam is solidifying, so as to insure the avoidance of displacement : this can be done by a little sealing-wax, or what is better, " marine glue*." Venetian turpentine may be used instead of Canada balsam, and it solidifies much more rapidly, but it is neither so transparent nor so readily managed.

A large number of the most beautiful and delicate objects cannot be preserved in the dry way, the shrivelling and contraction which ensue totally destroying the natural appearance. These are best kept in a small cell containing a liquid, which must be prevented from evaporating. The liquids mostly used are, syrup mixed with gum, dilute spirit, water saturated with creasote, or the fluid invented by Mr. Goadby, and which is the best. It is thus made :— take 4 oz. of bay salt, 2 oz. of alum, 4 grs. of corrosive sublimate, and 2 qts. of boiling water; these must be well stirred together, and filtered through fine filtering paper. This is an excellent composition for preserving animal and vegetable substances, and has less action upon them than any of the other fluids. The spirit or water and creasote corrugate the preparations so as in many cases entirely to destroy their characteristic appearances, and the syrup has a powerful exosmotic action, which collapses all vesicular preparations. There are two methods of forming the cells here : in the first a varnish is used to inclose the liquid ; in the second a wall is formed to the cell, of glass, &c.

A quantity of very thin glass (from the $\frac{1}{100}$th to the $\frac{1}{300}$th of an inch) must be procured†, and cut into square or oblong pieces of various sizes, according to that of the thick glass support, which, for the sake of avoiding repetition, I shall call the base of the specimen. The thin glass should not be longer than is absolutely necessary, so

* It is thus made :—dissolve 1 lb. of caoutchouc in 4 gallons of coal naphtha by maceration for several days, and with 1 pint of this solution, 2 lbs. of shell-lac are to be mixed by heat; and when the fusion is completed, the material is to be poured out on a cold slab and moulded into convenient forms, and used as sealing-wax.

† This can be obtained at any optician's.

as to avoid the risk of its being broken. The base is now wiped perfectly dry and clean, the object laid on its centre; a small quantity of the preservative liquid is next dropped on it; upon this is laid the thin glass square, wiped perfectly clean: should the quantity of liquid added be not sufficient to fill the whole space between the two glasses, a little more must be added* until such is the case; if too much has been added, it may be readily removed by a fine pipette, camel-hair pencil, or moistened piece of blotting paper. When the surfaces of both glasses, not in apposition, are quite free from moisture, some gold size thickened by intimate mixture with lamp-black must be laid all round the edges of the thin glass, partly also upon the contiguous portions of the lower, so as to hermetically inclose the liquid and the object. The mixture of the finely-powdered lamp-black and the gold size (the latter of which ought to be old) should be about the consistency of treacle, or rather less. If made too thin, it is apt to run in under the upper glass and destroy the specimen.

When the objects are large, the following mode is generally adopted. A circular depression is excavated in the substance of the basic slip, which is double or treble the ordinary thickness, and in this the object and the liquid are placed; these are then covered with thin glass, and the gold size and lamp-black applied as above around the edges of the latter. Or a square piece of thick crown glass, less in size than the breadth of the basic slip, has either a circular or square hole drilled through it; this is next fastened to the base either by Canada balsam or varnish; a cell is thus made in which the object and liquid are placed; the thin glass slip is next applied upon the upper surface of the excavated piece; it is then covered at the edge, and rendered adherent to it by the gold size and lamp-black.

Another method is this. Take a basic slip of glass, and spread a little white lead ground up with oil (or painter's white paint) on its upper surface, leaving an aperture in the middle to receive the object. This requires to be painted over and over until it has become of the thickness of the specimen to be preserved; the blank space or cell is next filled with one of the preservative liquids, and the object then immersed in it; a slip of thin glass is now laid upon the surface of the white lead and rubbed close on to the paint, beginning at one end and passing across the slide to the other, so as to force out any air-bubbles. When dry the specimen is permanent. These will, I think, be found sufficient for the preservation of almost any objects; there are, however, a few which it is very difficult to retain perfect. Many I have preserved simply by leaving them to dry between two slips of glass, without any preservative fluid or balsam. Blood-discs, &c. have kept remarkably well in this manner; but we can place no dependence on so doing, for one which is good perhaps there are twenty spoiled. Talc was formerly used instead of thin glass to cover objects, but it is very objectionable on account of its being so readily scratched, the difficulty of procuring it free from flaws, and its pe-

* On the end of a camel-hair pencil or pen; it will run in by capillary attraction.

culiar effect in polarizing light. There is only one circumstance more worthy of mention, and which is very common but very injurious: it is the placing too much of an object on a slide at once; this often renders a beautiful object of little value. I need hardly say that it is better, if possible, to preserve most specimens under thin glass, so that at any future time they can be examined by the high powers of the microscope, if necessary.

9 St. John's Square, July 21, 1843.

XVIII.—*Observations on Two of Professor Edward Forbes's "Retrospective Comments."* By Arthur Hill Hassall, Esq.

Professor Edward Forbes, in a paper entitled "Retrospective Comments," a portion of which is inserted in the 'Annals' for July 1843, makes some remarks on the genus *Echinocorium,* and on the Phosphorescence of Zoophytes, on both of which I wish to offer a few observations. Mr. Forbes appears to reject my genus *Echinocorium* on the twofold ground, that the zoophyte which I regard as its animal is sometimes met with unconnected with the polypidom, and that in those cases in which the two are associated, no organic bond of union exists between them. With regard to the first point, the result of my experience is, that the polype is never met with but in connexion with the polypidom, and that its distribution is always limited to that portion of the shell covered by it; and I may remark, that I have very frequently obtained the living zoophyte. With reference to the absence of structural connexion, Mr. Forbes observes, "Had Mr. Hassall looked a little closer to his specimens, he would have found that there is no organic connexion between the parasite and its base, and that each *Coryne* is an independent animal, capable of detachment without injury." I beg to assure Mr. Forbes that I did look very closely to my specimens, and that the issue of my examination of them was a conviction of the reality of a bond of union,—a conviction arrived at by the observation of the following particulars, viz. that marked depressions existed in the polypidom for the reception of the bases of the polypi; that the whole structure of the polypidom itself was porous and incorporated with gelatinous material; and lastly, that it was also encrusted by a membrane derived from the polypi themselves, and which likewise covered the muricated processes. These facts, if not conclusive, are yet I hope sufficient to exonerate me from the charge of having "too hastily constituted the genus *Echinocorium,*" and show that I did exercise a common degree of caution. Besides, supposing Mr. Forbes to be correct as to the independence of the polype regarded by me as the true zoophyte of *Alcyonidium echinatum,* which I am far from being satisfied that he is, still this

does not render the rejection either of the genus, right or necessary, or of the appellation which I have bestowed upon it, for abundant grounds may be derived from an examination of the remarkable polypidom itself to justify and demand its separation from the genus *Alcyonidium*.

By Mr. Forbes's remark, that "each *Coryne* is an independent animal, capable of detachment without injury," I understand that it will live when thus separated. This fact is by no means conclusive of the point at issue, for the *Hydra* will bear any degree of mutilation and injury without destruction of its vital powers. Mr. Forbes not only rejects the idea of any organic union between the polype and polypidom, but hardly seems to allow that the former shows any preference for the latter, observing, that "from the excellent holding afforded by the polypidom, it *perhaps* prefers such a residence." The doubt implied by the word *perhaps* is certainly unnecessary, for whatever difference of opinion there may be relative to structural connexion between the two, there can be none whatever but that the polype exhibits a remarkable preference for the polypidom of the *Echinocorium*. The zoophyte which I regard as the animal of the *Echinocorium*, Mr. Forbes considers to be a *Coryne*, and says that it is "a common deep-sea form of that genus." Common as the species is stated to be, it had neither been described nor figured by British actinologists up to the period of the publication of a paper by me on Zoophytes in the 'Annals' for July 1841. One other point still remains to be noticed in connexion with the *Echinocorium*. I cannot of course doubt but that Mr. Forbes has met with a *Coryne* distinct from any perfectly formed polypidom. This *Coryne* might, however, either have been of a different species from the animal of *E. clavigerum*, or, if identical with it, it is possible that the polype might in some cases exist either in the entire absence of the polypidom, or that this might have been in some degree formed, although it had escaped the notice of Mr. Forbes, who, while he disallows my view of *Echinocorium*, does not offer any exposition of its real nature; that is, he leaves it wrapt up in the obscurity in which it has been so long involved, and from which I have endeavoured to rescue it.

In referring to my papers on the Phosphorescence of Zoophytes, and to that by the Rev. D. Landsborough, Mr. Forbes observes, "the *general* fact" of the phosphorescence of zoophytes "has long been known to British naturalists." This statement is remarkable. If so, how comes it that no general reference is made to a fact so generally known according to Mr. Forbes, and one, moreover, of the highest interest, in Dr. Johnston's excellent 'History of the British Zoophytes?' And then adds Mr. Forbes, in continuation of the same paragraph, "although but little had

been written about it, more precise observations than we have yet on record being required." Mr. Forbes does not mention what this little is. I will endeavour to supply the deficiency. The only references with which I am acquainted, as emanating from British naturalists, to the fact of the emission of phosphoric light by zoophytes, relates to two species, *Sertularia pumila* and *Pennatula phosphorea*. In Dr. Johnston's description of the former, the following quotation from Stewart occurs:—" This species, and probably many others, in some particular states of the atmosphere, gives out a phosphoric light in the dark. If a leaf of the above *Fucus* (*serratus*) with the *Sertularia* upon it receive a smart stroke with a stick in the dark, the whole coralline is most beautifully illuminated, every denticle seeming to be on fire."

This quotation is succeeded by some beautiful lines, the appropriateness of which may excuse a repetition of them here.

> " While thus with pleasing wonder you inspect
> Treasures the vulgar in their scorn reject,
> See as they float along the entangled weeds
> Slowly approach, upborne on bladdery heads;
> Wait till they land, and you shall then behold
> What fiery sparks these tangled fronds infold,—
> Myriads of living points; the unaided eye
> Can but the fire, and not the form descry."—*Crabbe.*

With regard to the second species, *Pennatula phosphorea*, the knowledge of the existence of the phænomenon of phosphorescence in it is sufficiently attested by the specific name, so that it is unnecessary to adduce the testimony of those who make mention of it. Such, it seems to me, was the extent of the knowledge of British naturalists, so far as this can be ascertained by reference to their writings (the only admissible evidence), of the beautiful phænomenon of the phosphorescence of zoophytes, up to the time of the publication of my essay on Zoophytes in the 'Annals' for June, 1841, in which it was distinctly stated, that all the transparent species, while in a living state, possessed phosphoric properties; and I leave it to the reader to judge whether this was sufficient to justify the assertion, that " the general fact" of their phosphorescence had " long been known to British naturalists*" prior to that time. Mr. Forbes also seems to imply that the general fact stands in need of more precise observations than we have yet on record for it.

I cannot but think that the papers alluded to in the beginning

* The general fact of the phosphorescence of zoophytes may have been known to continental naturalists prior to the publication of my essay. I am not, however, sufficiently acquainted with their writings to assert positively whether it was or was not to any or all of them.

of these few remarks are sufficient to establish the general fact, while they certainly do not preclude the necessity of further and closer investigation. I am at a loss to conceive what Mr. Forbes's object has been in penning his remarks; their tendency is certainly to depreciate the knowledge which has been already acquired of one of the most striking and beautiful of the many facts of interest connected with the history of zoophytes.

Cheshunt, July 15, 1843.

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An Inaugural Lecture on Botany. By Edward Forbes, F.L.S., F.B.S. &c. Van Voorst, London. 8vo. pp. 23.

The author of this inaugural address is probably better known to our readers as a zoologist and the historian of the British Starfishes than as a botanist. But amongst those who best know his enthusiastic devotion to the whole range of natural-history science, he has always been distinguished for the extent and accuracy of his knowledge of botany, and we congratulate the Institution with which he is now connected on having obtained the services of so valuable a teacher. It may be important, in the selection of lecturers in our public schools, that men should be sought for who possess a profound and intimate acquaintance with the subjects they are about to teach, but at the same time it should not be forgotten that our branches of science are mere artificial divisions—parts of one great whole, and that to teach one properly, its relations to others should be understood. This is of especial importance in a course of medical education comprising many sciences, where the object is rather the pointing out to the student the relation which each particular science bears to the profession on which he has entered, than making him profoundly acquainted with any particular department. There has been no more prevalent error amongst the great body of medical men, than supposing that the study of disease was their only business, and that the study of the natural-history sciences was a mere impertinence, or at most to be regarded as an ornament; and this error we suspect will always be most prevalent where the chairs of chemistry, botany, &c. in our medical schools are filled by those who are unacquainted with the relations which these subjects bear to the study of medicine. We are glad therefore to see a gentleman educated for the medical profession, a zoologist and geologist, in the chair of botany at King's College.

At the present day there is perhaps too great a tendency to regard education as the mere cramming of so many facts into the heads of the taught, and in no profession is this carried to a more vicious extent than in the medical. It seems to be forgotten that the most effective education is to fit a person, not by the amount of facts that he knows, but by rendering him capable of using the facts that are presented to him, for the skilful exercise of the profession he

has undertaken. It is on this ground that Professor Forbes recommends the study of natural science to the medical student.

"That the medical student acquires but little by his attendance at botanical lectures, is not an uncommon fancy among the senior members of the profession. Some eminent men have gone so far as to denounce it as lost time. The utmost the student is supposed to carry away is a knowledge of the names, classes and orders of such plants as furnish products used in medicine. It seems to me that the true object of the connexion of natural-history studies with more professional pursuits is, as in this case, too generally lost sight of, and I gladly avail myself of this opportunity to urge their claims on your attention, and to plead for them on grounds which have not been put forward sufficiently prominently hitherto, though by no means novel, seeing that the positions I am about to maintain are avowedly acknowledged in private by most scientific teachers, though rarely advanced in the class-room. The plea which I wish to advance is, that the main use of the natural-history sciences to the student is not merely the teaching him a certain number of facts, the recollection of which may be serviceable to him in after life, but the training his mind, by means of the peculiar forms of research which characterise those sciences, to that tone and vigour which must be of the utmost consequence in giving him power for future professional avocations of a different nature, especially such as are to form the after-occupations of the student of medicine.

"Not that for a moment I would have you suppose that I am depreciating the value of a knowledge of the facts of natural history,—far from it: I have myself derived too much pleasure, too much benefit from an early study of that delightful science not to appreciate its full value, and not to be desirous of seeing all men acquainted with it; but that, viewing it as a branch of education, I am anxious to point out in what its true educational value lies, and not to evade the question by enumerating how many animals, plants and minerals a student may be able to recognise if he diligently pursue zoology, botany, or mineralogy. A student of any science, well-trained in the modes of investigation which that science teaches, is a much more valuable member of society than a youthful encyclopedia or a living book of facts."

We believe that this ground on which Professor Forbes would have medical students cultivate botany is the one on which natural science should form a part of the education of the divine, the advocate and the statesman. It may not be of much consequence, that a man should know the Latin name of chickweed, the number of stamens in a butter-cup, or the shape of the blood-globules of a frog, but it is of importance that he should understand the laws of organic matter, and be acquainted with the nature of its investigations. It is in these investigations that the simplest principles of analysis and synthesis may be exemplified, and in which they will bear their most profound application. We know that the advocate of a classical and mathematical education will say that language and numbers afford sufficient material for the application of these principles, but we maintain that there is as much difference between the investigation of words as the expression of facts or phænomena, and the investigation of facts themselves, as there is between words and numbers themselves, and upon this ground we would require of every one seeking distinction as an educated man, a knowledge of the natural sciences.

But to return to Mr. Forbes. After adverting to the importance

of the study of botany as a training science, he proceeds to point out the value of its facts to various classes. To the medical man and the agriculturist they are essential. We recommend the following to our readers :—

"The utility of a study of botany to the zoologist and geologist cannot be too highly estimated. The perfection to which the labours of Linnæus, DeJussieu, DeCandolle and their numerous co-labourers and pupils have brought systematic botany, furnishes the zoologist with a sound model on which to mould the descriptive part of his science, but one with which he is usually I fear too slightly acquainted to make good use of. Zoology has yet to attain the precision to which botany so rapidly advanced through the logical acuteness of the great minds who embraced the study,—a precision greatly forwarded by the general knowledge of their subject which they considered it their duty to acquire before they engaged in original special research. The perfection to which botanical diagnosis has attained is truly astonishing. More than 50,000 species of known plants are distinguished from each other by short summaries of their essential characters, sometimes occupying but a few words, and at most but a few lines. Yet there is no confusion. The printed diagnosis is sufficiently precise to enable the student to ascertain the name and affinities of any plant he may gather even without the help of figures or other artificial aid. That zoological science may attain an equal degree of precision, no thinking naturalist can for a moment doubt; but until more zoologists than now do, study the principles by which such precision has been attained, their science must rest in the unsatisfactory state which deforms great portions of it at present.

"The importance of a knowledge of botanical science to the geologist rests on different grounds. Perhaps to him its greatest value may lie in conferring that training which I have advocated in commenting on the botanical studies of the physician. But it is also of the greatest use in enabling him to understand the nature and relations of the numerous fossil remains of vegetables imbedded in the earth's strata, and the examination of which affords such important data for determining the relative ages of formations, and the conditions under which they were formed. When we recollect that the great beds of coal, which furnish such a valuable item in the list of our economical comforts, have been derived from the destruction of ancient herbs and trees, we must view with astonishment the important part played by the vegetable kingdom in contributing to the substance of the earth's crust."

At a time when our manuals, local floras, and guide-books have rejected the Linnæan system, many of our older friends who have had no other guide to the mysteries of classification, and have been surprised to see it so suddenly and generally supplanted, will read with interest the following testimony in its favour :—

"Those who slightingly think of the Linnæan system, as it is termed, forget in the present to look back fully and fairly on the past. They should remind themselves of the state in which botany was when Linnæus undertook to make its treasures consultable. The understanding of things depends greatly on the perception of their order and relations. When that order and those relations require deep study ere we can comprehend them clearly, the man who gives us a clue, however insignificant it may be in its own nature, is not only conferring on us an invaluable benefit, but endowing the despised instrument with golden value. Such a clue did Linnæus give when he put forth the sexual system. The scientific systematist, surrounded by the stores of his herbarium, should not forget that those treasures were often amassed

in the first instance by adventurous and earnest men, rendering good service by their hands and energy, as good in its humble way as that which he gives by his head and philosophy. It was not to be expected of such men that in the field they should occupy themselves with thoughts of arrangement or affinity; their part was to observe and select, and the guide to their observation and selection was in most cases no other than the Linnæan system. In the scientific hive as in the apiary there must be working-bees and neuters as well as queens and drones: it is necessary for the economy of the commonwealth. An easy means of acquiring and arranging information is a great help to the workmen of science, and no department has gained more thereby than botany, which, through the facilities afforded by the artificial method devised by Linnæus, has had its facts amassed in enormous quantity for the use of its more philosophic votaries, and owes its present advanced state in a great measure to such humble means.

"The clue to the labyrinth, then, having served such noble purpose becomes a consecrated object, and should rather be hung up in the temple than thrown aside with ignominy. The traveller returning from his adventurous and perilous journey of discovery, hangs up his knapsack with affection on the wall of his study. But travellers must return to the fields, if more is to be done; and so must botanists, and each must have recourse again and again to those helps which aided them so well in their earliest journeys."

We are quite willing to hang this system up in the temple anywhere as long as it does not interfere with plants, and we think, as far as our own island is concerned, especially since the publication of Lindley's 'Synopsis,' the last edition of Hooker's 'Flora' and Babington's 'Manual,' that we should never wish again to disturb its dignity by carrying it into the fields. In conclusion, we recommend Professor Forbes's lecture as well worth the attentive perusal, not only of the student and teacher of medical science, but of all who take an interest in the advancement of sound education.

Recherches sur l'organisation, la fructification et la classification de plusieurs genres d'Algues, avec la déscription de quelques espèces inédites ou peu connues.

Essai d'une répartition des Polypiers calcifères de Lamouroux dans la classe des Algues. Par J. F. Chauvin: Caen, 1842.

These memoirs, which were prepared as academical theses, are of considerable interest to the algologist, both physiologically and systematically. Several points regarding obscure or little-known species are illustrated, and the different questions which have lately interested algologists are discussed with little of that controversial tone which has, we know not how, insinuated itself into several recent memoirs on the subject. The notions of Decaisne on the double fructification of Algæ are ably treated, and are, at least, shown to be premature. The opinion of algologists, both theoretical and practical, is opposed to them; and Mr. Griffiths especially, who has devoted years to the study of the marine Algæ, is satisfied that they are incorrect. We cannot, however, at present consider the subject as at all settled, especially supported as it is by what is known of the germination of Algæ.

It appears that there are very many modes of reproduction amongst

Algæ. Dulz, in his third memoir, mentions four modes of reproduction which he has observed in the *Ceramia*. Messrs. Crouan have traced the vegetation of the sphærospores before their separation into four distinct bodies, while Agardh has observed the germination of the spores of which the sphærospore are composed, and also that of the spores contained in the capsules. And in the zoospermic Algæ, both the zoosperms and spores produce perfect plants. The probability is that all are in the main correct, and that their views are not irreconcilable, however different they may appear at first; and truth will appear at length, not by the questioning of the observations of others, but by the patient and unprejudiced comparison of all.

Much remains to be done as regards the arrangement of Algæ, and it is very much to be desired that Dr. Montagne, who has perhaps in his hands the largest mass of original matter of any algologist, and that in great measure ready for publication, would devote his attention to the subject generally, to which he would, we doubt not, do as much justice as he has done in his notices of individual genera or tribes. The ample materials he possesses, his admirable tact in microscopic researches, his accurate pencil, his intimate acquaintance with all that has been published in various languages, and above all his unwearied diligence, his accurate judgement and his very luminous style of writing, are all guarantees of his especial fitness to undertake a complete revision of the subject, which could not fail to promote exceedingly this branch of botany.

It is now proved incontestably that the calciferous Polypiers of Lamouroux belong to the order of Algæ. The memoirs of Kutzing and Decaisne are decisive on the subject, and the observations made by Chauvin, which are very judicious and interesting, would tend to confirm their views, if they needed confirmation. We recommend the work of the learned Professor, who has been long known to science by his labours in this beautiful tribe of plants, as one which cannot fail both to instruct and interest.

As regards the analogies of *Podaxineæ*, M. Montagne remarks, that *Spumaria* reminds us of *Gyrophragmium*; that *Æthalium* is of a celluloso-spongy substance, as *Secotium*; and finally, that there is a columella in *Stemonitis* and many other genera.

The memoir closes with the following considerations :—From the researches of Mr. Berkeley it appears that a multitude of subterraneous fungi (*Fungi hypogæi*), which, after a deceptive analogy, had been improperly referred to *Tuberaceæ*, belong beyond all doubt to *Lycoperdaceæ*, and that these, at least as regards their mode of fructification, are much nearer to the *Hymenomycetes*; while the *Tuberaceæ*, regarded from the same point of view, bear more resemblance to the *Discomycetes* of Fries, or to the *Hymenotheciæ* of Persoon, since the reproductive bodies being contained in asci are real sporidia. The recent labours of Tulasne and Vittadini have confirmed these observations, which may now be regarded as established in science.

If now we would follow in thought the succession of different forms by which, in their ascending series, the fungi of the two families to which the names of *Hymenomycetes* and *Gasteromycetes*

have been given, it cannot escape our notice, notwithstanding their apparent difference, that the same plan has presided at their formation, or in other words, that they possess a unity of structure. We observe, however, this remarkable circumstance in their mode as in their degree of evolution, that the one always seek the light, under the influence of which the principal phænomena of their fructification take place, while the others pass through the first, or all the phases of their life, free from the influence of this modifying power; that is to say, that they ripen their spores in a closed receptacle, and that in general this opens only when they are ready for dispersion. The evolution of the second is, as we may say, of a lower grade than that of the first. But in comparing *Gyrophragmium* especially with an Agaric, it is easy nevertheless to perceive the perfect analogy which exists between the two series, examined towards their culminating point. The resemblance would be still more striking and almost complete, at least as regards external form, if it be proved some day that *Montagnites* belongs also to the *Gasteromycetes*, as we are permitted to suspect from its affinity with *Gyrophragmium*. It is then that the simplicity and independence of the partitions,—carried to the highest degree, since they are fixed to the top of the stem by a single point, frequently by a short thread, and radiate horizontally like the gills of an Agaric,—it is then, I say, that this independence and simplicity would raise the *Gasteromycetes* almost to the same grade as the *Hymenomycetes*, always however considered abstractedly of their morphosis, which is essentially different*.

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

February 1, 1843.—"On the Geological position of the *Mastodon giganteum* and associated fossil remains at Bigbone Lick, Kentucky, and other localities in the United States and Canada." By Charles Lyell, Esq., V.P.G.S.

With a view to ascertain the relations of the soil in which the bones of the Mastodon are found, to the drift or boulder formation, whether any important geographical or geological changes had taken place since they were imbedded, and what species of shells are associated with them, Mr. Lyell visited a number of places where they had been obtained. In this paper he gives the result of his researches.

The most celebrated locality visited was Bigbone Lick, in the northern part of Kentucky, distant about 25 miles to the S.W. of Cincinnati, situated on a small tributary of the river Ohio called Bigbone Creek, which winds for about 7 miles below the Lick before joining the Ohio. A "Lick" is a place where saline springs break

* The latter part of this article is translated from 'L'Institut,' May 4, 1843.

out, generally among marshes and bogs, to which deer, buffaloes, and other wild animals resort to drink the brackish water and lick the salt in summer. The country around Bigbone Lick, and for a considerable distance on both banks of the Ohio, above and below it, is composed of blue argillaceous limestone and marl, constituting one of the oldest members of the transition or Silurian system. The strata are nearly horizontal and form flat table-lands intersected by numerous valleys in which alluvial gravel and silt occur; but there is no covering of drift in this region. The drift is abundant in the northern parts of Ohio and Indiana, but disappears almost entirely before we reach the Ohio.

Until lately herds of buffaloes were in the habit of frequenting the springs, and the paths made by them are still to be seen. Numbers of these animals have been mired in the bogs, and horses and cows have perished in like manner. Along with their remains are found innumerable bones of Mastodon, Elephant, and other extinct quadrupeds, which must have visited these springs when the valley was in its present geographical condition in almost every particular, and which must have been mired in them as existing quadrupeds are at present. The mastodon remains are most numerous and belong to individuals of all ages. The mud is very deep, black, and soft. In places it is seen to rest upon the limestone, and at some points it swells up to the height of several feet above the general level of the plain and of the river. It is occasionally covered by a deposit of yellow clay or loam, resembling the silt of the Ohio, which is from 10 to 20 feet thick, rising to that height above the creek and often terminating abruptly at its edges. This loam has all the appearance of having been deposited tranquilly on the surface of the morass and of having afterwards suffered denudation. The Mastodon and other quadrupeds have been mired before the deposition of the incumbent silt, for a considerable number of fossil bones have been found by digging through it. Accompanying the bones are freshwater and land shells, most of which have been identified by Mr. Anthony with species now existing in the same region.

Mr. Lyell observes that the surface of the bog is extremely uneven, and accounts for it partly by the unequal distribution of the incumbent alluvium which presses with a heavy weight on certain parts of the morass, from which other portions of the surface are entirely free. He also attributes it in part to the swelling of the bog where it is fully saturated with water near the springs.

The author is of opinion that the fossil remains of Bigbone Lick are much more modern than the deposition of the drift, which is not present in this district. But although the date of the imbedding of these mammalian fossil remains is so extremely modern, considered geologically, it is impossible to say how many thousand years may not have elapsed since the Mastodon and other lost species became extinct. They have been found at the depth of several feet from the surface, but we have no data for estimating the

rate at which the boggy ground has increased in height, nor do we know how often during floods its upper portion has been swept away.

Ohio.—The Ohio river immediately above and below Cincinnati is bounded on its right bank by two terraces consisting of sand, gravel and loam, the lower terrace consisting of beds supposed to be much newer than those of the upper. In the gravelly beds of the higher terrace teeth both of the Mastodon and elephant have been met with. Mr. Lyell was assured that a boulder of gneiss, 12 feet in diameter, was found resting on the upper terrace, about 4 miles north of Cincinnati, and that some fragments of granite had been found in a similar situation at Cincinnati itself. These facts show that some large erratics have taken up their present position since the older alluvium of the Ohio valley was deposited. In travelling northwards from Cincinnati towards Cleveland, Mr. Lyell found the northern drift commence in partial patches 25 miles from the former city and about 5 miles N.E. of Lebanon, after which it continually increased in thickness as he proceeded towards Lake Erie.

New York—Niagara Falls.—In a former paper Mr. Lyell alluded to the position of the remains of Mastodon, 12 feet deep, in a fresh-water formation on the right bank of the river Niagara at the Falls. He remarks that if we had not been able to prove that the cataract had receded nearly four miles since the origin of the fluviatile strata in question, we should have been unable to assign any considerable duration of time as having intervened between the inhumation of the Mastodon in marl full of existing shells and the present period. The general covering of drift between Lakes Erie and Ontario is considered to be of much higher antiquity than the gravel containing the bones of the Mastodon at the Falls.

Rochester.—In the suburbs of this city remains of the *Mastodon giganteum* were found associated with existing species of Mollusca in gravel and marl below peat.

Genesee.—Here remains of the *Mastodon giganteum* were found with existing shells in a small swamp in a cavity of the boulder formation, so that the animal must have sunk after the period of the drift when a shallow pond fed by springs was inhabited by the same species of freshwater mollusca as now live on the spot.

Albany and Greene Counties.—Mr. Lyell examined, in company with Mr. Hall, two swamps west of the Hudson River, where the remains of Mastodon occurred in both places at a depth of four or five feet, precisely in such situations as would yield shell marl, and peat, with remains of existing animals in Scotland. Cattle have recently been mired in these swamps.

According to Mr. Hall the greatest elevation at which Mastodon bones have been found in the United States is at the town of Hinsdale, situated on a tributary of the river Allegany in Cattaraugus county in the State of New York, where they occur at an elevation of 1500 feet above the level of the sea.

Maryland.—In the museum at Baltimore, Mr. Lyell was shown the grinder of a Mastodon, distinct from *M. giganteum*, and which

had been recognised and labelled by Mr. Charlesworth as *M. longirostris*, Kaup. It was found at the depth of 15 feet from the surface in a bed of marl near Greensburgh, in Carolina County, Maryland, and is considered by Mr. Lyell as a miocene fossil.

Atlantic border.—Between the Appalachian mountains and the Atlantic there is a wide extent of nearly horizontal tertiary strata, which at the base of the mountains are 500 feet and upwards in height, but decline in level nearer the ocean and at length give place to sandy plains and low islands skirting the coast, in which strata containing marine shells of recent species are met with, slightly elevated above the sea. Occasionally deposits formed in freshwater swamps occur, below the mean level of the Atlantic or overflowed at high tide. In this district Mr. Nuttall discovered, on the Neuse 15 miles below Newburn, in South Carolina, a large assemblage of mammalian bones, including those of the *Mastodon giganteum*, resting on a deposit containing marine shells of recent species. Mr. Conrad presented Mr. Lyell with the tooth of a horse covered with barnacles, from this locality. Professor Owen has examined it and could find no corresponding tooth of a recent species, but considers it as agreeing with the horse-tooth brought by Mr. Darwin from the north side of the Plata in Entre Rios in South America.

South Carolina.—Remains of the Mastodon were found in digging the Santee Canal, in a spot where large quadrupeds might now sink into the soft boggy ground.

Georgia.—Bones of the Mastodon and Megatherium occur in this district in swamps formed upon a marine sand containing shells of species now inhabiting the neighbouring sea.

Mr. Lyell in conclusion offers the following observations :—

1. That the extinct animals of Bigbone Lick and those of the Atlantic border in the Carolinas and in Georgia belong to the same group, the identical species of Mastodon and elephant being in both cases associated with the horse, and while we have the Mylodon and Megatherium in Georgia, the Megalonyx is stated by several authors to have been found at Bigbone Lick.

2. On both sides of the Appalachian chain, the fossil shells, whether land or freshwater, accompanying the bones of Mastodons, agree with species of Mollusca now inhabiting the same regions.

3. Under similar circumstances Mr. Darwin found the Mastodon and horse in Entre Rios, near the Plata, and the Megatherium, Megalonyx and Mylodon, together with the horse, in Bahia Blanca in Patagonia; these South American remains being shown by their geological position to be of later date than certain marine Newer Pliocene, and Post-pliocene strata. Mr. Darwin also ascertained that some extinct animals of the same group are more modern in Patagonia than the drift with erratics.

4. The extinct quadrupeds before alluded to in the United States lived after the deposition of the northern drift, and consequently the coldness of climate which probably coincided in date with the transportation of the drift, was not as some pretend the cause of their extinction.

BOTANICAL SOCIETY OF LONDON.

July 7th.—J. E. Gray, Esq., F.R.S. &c., President, in the Chair.

Read "Observations on *Dicranum Dillenii* (MSS. T. T.)," by Dr. Thomas Taylor.

As Dillenius is the first author who has directed the attention of botanists, seventy-five years ago, by a separate paper, to the present moss, his name has been ascribed to it, and yet it is plain that he, as well as all subsequent muscologists, have confounded it with *Dicranum Scoparium* (Linn.). Nor is this without excuse, when we consider the strong resemblance of the habit of both, their nearly equal size, their very general occurrence in Europe as well as in the northern parts of America, and particularly their frequently growing together in the same woods, or on the same banks, in more open and mountainous situations. Besides, the present plant varies very considerably in appearance, so that the one state well figured in 'English Botany,' t. 354, as *Dicranum Scoparium*, would scarcely be supposed to belong to the same species as another state equally well represented by Schwægrichen in his 'Supplement,' t. 42, under the same name. It is the wide limits within which its aspect changes that probably weighed with the editors of the 'Muscologia Britannica' to give both species, well represented, as varieties only of *Dicranum Scoparium*. Submitted, however, to a rigid scrutiny, Dr. Taylor apprehended that the following distinctive marks would be found to be constant; and if so, they would appear to be both sufficiently numerous and sufficiently grave to establish the present species.

1. *Dicranum Dillenii*, though frequently differing in size, is usually the smaller moss. 2. Its leaves are not constantly and but slightly turned to one side, while in *Dicranum Scoparium* they are more loosely set and uniformly falcato-secund. 3. In the present the pedicels are solitary, in the other aggregated within the same *perichætium*. 4. In the former the pedicels are opake, even immediately below the capsule at the period of full maturity; they are reddish below and brownish-yellow above; while in the latter, even when full-grown, they are somewhat pellucid and of a pale straw-colour. 5. In the former the capsule is erect below and slightly curved above, is nearly equal, has no projecting *struma* yet, with an apophysis pale brown when ripe; in the latter the capsule is curved even long before the fall of the *calyptra*, is very unequal, has a projecting *struma*, and is green when just ripe. 6. In the former the *operculum* is gradually acuminated and falls after the *calyptra*; while in the latter the *operculum*, with a broad base, is suddenly acuminated, and usually falls on and with the *calyptra*. 7. In *Dicranum Dillenii* the teeth of the peristome are narrower and more opake. 8. The stem is often interruptedly leafy. 9. The leaves are shorter, and have their points less curved. 10. The parts of fructification are greater in proportion to the size of the plant.

In the museum of the Society occurs a *Dicranum* from Newfoundland, from the late Mr. Lambert's herbarium, which being barren, and so not admitting of a comparison of the parts of fructification,

Dr. Taylor would not venture to separate from *Dicranum Dillenii*, and yet its densely aggregated and shorter stems, its shining lustre and its less patent leaves, would demand the greatest attention, and would indicate it as at least a very remarkable variety; but when we consider its leaves shorter, wider in the lower half, and their points more canaliculate, with their nerve serrated at the back, it must be confessed its claims to be separated are very strong.

BOTANICAL SOCIETY OF EDINBURGH.

This Society held its last meeting for the season on Thursday, July 1843. President, Dr. Neill, in the Chair.

The following papers were then read:—

1. "On the genera *Gomphonema* and *Meridion*," by Mr. John Ralfs, Penzance*.

2. "On four new species of British *Jungermanniæ* *," by Thomas Taylor, M.D., Dunkerron.

3. "On a species of *Fungus* found imbedded in Peat, near Stirling." Communicated by Mr. Peter Mackenzie, West Plean.

The attention of botanists has recently been directed to the importance of studying the vegetable remains imbedded in peat-mosses, as calculated to throw light on the early vegetation of the country, and the successive changes it has undergone. For this object, communications like that from Mr. Mackenzie are much to be desired.

A letter was also read from Dr. Joseph Dickson, St. Helier's, Jersey, mentioning some interesting additions to the flora of that island which he had lately discovered, and remarking, that he felt convinced it contains many other species still unknown to botanists.

ZOOLOGICAL SOCIETY.

October 11, 1842.—R. H. Solly, Esq., in the Chair.

A paper, "On the Blood-corpuscles of some of the *Struthionidæ*,' by George Gulliver, Esq., was read.

I had lately an opportunity of examining the blood of a young Ostrich, killed by accident in the Society's menagerie. The following measurements of the corpuscles are expressed in vulgar fractions of an English inch:—The average length of the discs = 1-1649 inch, average breadth of the discs = 1-3000 inch, thickness of the discs = 1-9166 inch: dimensions of the nuclei, exposed by dilute acetic acid—length = 1-3200 inch, breadth = 1-9166 inch, diameter of the pale globules of the blood = 1-3329 inch.

I have given several measurements of the blood-discs of the Emu and of the Rhea in the 'Appendix to Gerber's Anatomy,' p. 77, from which the following averages are taken:—

Emu (*Dromaius Novæ-Hollandiæ*, Vieill.).

Length.	Breadth.
1-1690	1-3031

* These papers will be subsequently given at full length in this Journal. —Ed.

American Ostrich (*Rhea Americana*, Briss.).

Length.	Breadth.
1-1898	1-3273

A comparison of these measurements will show that the blood-discs of the common Ostrich are slightly larger than those of the Emu and of the Rhea.

Mr. Fraser laid before the Meeting some new species of Birds, constituting part of his collection formed at Fernando Po, and characterized them as follows:—

PLATYSTEIRA CASTANEA. *Platys. vertice genisque cinereis, mento albo; dorso, alis supernè, gulâ et pectore castaneis; abdomine albo, appendiculis carnosis circum oculos rubris; rostro nigro iridibus rufescenti-fuscis; tarsis cæruleo-purpurescentibus.*

Inter sexus haud coloris diversitas.

Long. tot. $3\frac{5}{10}$ unc.; rostri, $\frac{6}{10}$; alæ, $2\frac{2}{10}$; caudæ, $\frac{8}{10}$; tarsi, $\frac{5}{10}$.

Hab. Clarence, Fernando Po.

Found among the branches of the naked trees in June, sometimes in pairs; they are short and thick in form, the feathering being of downy nature. Its note is short.

This bird differs from Jardine and Selby's *Platyrhynchus Desmarestii*, Ill. Orn., vol. i. pl. 9. fig. 2, in having the chestnut back and wings and the short black tail.

PLATYSTEIRA LEUCOPYGIALIS. *Platys.* (*mas*) *capite, genis, collo, dorso, alis, caudâ et vittâ latâ pectorali, sic et femoribus e cæruleo nigris, uropygio, gulâ et abdomine albis.*

Long. tot. 4 unc.; rostri, $\frac{6}{10}$; alæ, $2\frac{2}{10}$; caudæ, $\frac{9}{10}$; tarsi, $\frac{6}{10}$.

Hab. Clarence, Fernando Po.

Found in the same situations as *P. castanea.*

Fleshy appendages around the eye, red; irides, red hazel; bill, black; legs, purplish: the gizzard contained insects.

This bird differs from Jardine and Selby's *Platyrhynchus collaris*, Ill. Orn., vol. i. pl. 9. fig. 1, in having a white rump, the wings entirely black, the band across the chest much broader, and the fleshy appendage around the eye red.

PLOCEUS COLLARIS. *Ploc. vertice, capitis lateribus, et mento, nigris, torque collari lato, castaneo; rostro nigro, tarsis fuscescentibus, reliquis partibus aurantiaco, olivaceo et fuscescente variegatis, ferè ut in* Ploceo textore (*vide* Ploceus Textor, *Swains.*).

Long. tot. $7\frac{5}{10}$ unc.; rostri, $1\frac{2}{10}$; alæ, 4; caudæ, $3\frac{1}{2}$; tarsi, $1\frac{1}{10}$.

Hab. apud Insulam St. Thomas, Afric. occid.

This bird differs from *P. textor* in being of a greater size, in having the chestnut collar *encircling* the neck, and the general colouring of the body being less vivid.

EUPLECTES RUFOVELATUS. *Euplec.* (*mas*) *vertice et nuchâ, nitidè rubris, colore rubro in latera colli ducto; corpore in toto nigro, iridibus e corylo rubris, tarsis et rostro nigris.*

Long. tot. 7 unc.; rostri, 1; alæ, 4; caudæ, $2\frac{5}{10}$; tarsi, 1.

Hab. Clarence, Fernando Po.

A very good songster. These birds, although in deep moult (in June), appeared to be pairing. One specimen was shot from the top of a very lofty tree, the others much nearer the ground. In an apparently young male the black extends across the forehead.

October 25.—William Yarrell, Esq., Vice-President, in the Chair.

Prof. Owen exhibited a specimen of the Pearly Nautilus (*Nautilus Pompilius*), animal and shell, obtained by Capt. E. Belcher, R.N., at Amboina. Prof. Owen alluded to the fact of the specimen described by him in 1832 having been detached from the shell, which was destroyed in its capture, and to the analogies which had guided him in determining the position in which he had restored the soft parts to the shell, and figured them, *in situ*, in his memoir. Objections had been made to this restoration by Mr. Gray* and by Dr. Grant† and De Blainville‡, who were led by other analogies to believe that the upper or outer lip of the shell must have crossed the back of the head, instead of crossing the opposite side or funnel, as represented by Mr. Owen. M. Valenciennes, who had subsequently received the soft parts of a *Nautilus*, had adopted the position assigned to them in the shell by Mr. Owen.

The present example, in which the animal had been restored by Capt. Belcher to its shell in precisely the same position in which it was received by him, when recent, closely agreed with the description and figure in Prof. Owen's work§. The involuted spire of the shell is covered by the dorsal fold of the mantle, and is lodged in the concavity at the back of the muscular plate above the head. The funnel rests upon the outer wall of the large chamber containing the animal.

A paper by G. B. Sowerby, Esq., Jun., containing descriptions of two new species of shells belonging to the genus *Strombus*, was then read. The specimens were collected by the Society's Corresponding Member, H. Cuming, Esq., in the Philippine Islands, and exhibited by that gentleman to the Meeting.

Strombus crispatus, Sow. Jun., Thes. Conch. part i. pl. 8. f. 62, 63. *Str. testâ turritâ, fusiformi, concentricè plicatâ, spiraliter striatâ; aperturâ ovali, posticè in canalem brevem crispatam desinente; anticè canali brevi rostratâ; labio externo crasso, crenulato; labio interno crasso; operculo lateraliter serrato.*

Long. 1·5 ; lat. 0·40 poll.

Hab. Ins. Luzon, Panay, et Bureas, Philippinarum. H. Cuming legit.

A finely sculptured species resembling the well-known *Str. fissurella*, but rather more ventricose, with the edges of the posterior canal free, rather short, and coiled at the extremity. The colour is pale straw, with three brown bands across the body whorl.

* Phil. Trans. 1833, p. 774. † Lancet, Dec. 28, 1833, pp. 506, 509.

‡ Nouvelles Animales du Muséum, tom. iii. p. 7.

§ Memoir on the *Nautilus Pompilius*, 4to, 1832; published by the Royal College of Surgeons.

Strombus bulbulus, Sow. Jun., Thes. Conch. part i. pl. 9. f. 81, 82, 83. *Str. testâ ovali oblongâ, lævi, spirâ brevi; anfractu ultimo anticè obliquè truncato; aperturâ internè usque ad marginem striatâ; labio externo vix expanso, paululùm incrassato; sinu antico invalido; labio interno valido.*

Long. 1·45; lat. 0·60 poll.

Hab. Ins. Philippinæ. H. Cuming legit.

This species differs from *S. Terebellatus* in being more ventricose, in having the striæ in the aperture extended to the outer margin, and in having the inner lip more distinct.

Mr. Fraser communicated to the Meeting the following descriptions of new species of Birds, constituting part of the collection he had formed in the Niger expedition:—

Pelecanus rufescens, Gmel., vol. i. part 2. p. 571. sp. 13; Lath. Gen. Hist., vol. x. p. 404. sp. 8; Rüpp. Atlas, vol. ii. taf. 21.

This specimen was killed at Egga, in which place it was seen in large flocks in the month of October. This was the highest point to which the Niger expedition ascended. The specimen in question was killed by the late W. C. Willie, Esq., mate of H.M.S.V. Albert, and presented to Mr. Fraser by Lieut. J. W. Fairholme, R.N., of the same expedition.

Sylvia badiceps. *Sylv.* (*mas*) *vertice cinnamomino, plumis auricularibus et corpore superiore cinereis; alis caudâque e cinereo fuscis; genis gulâ, tectricibusque alarum inferioribus albis; fasciâ pectorali nigrâ; corpore inferiore cinereo, apud medium pallidiore. Iridibus e corylo-fuscis tarsis flavis.*

Long. tot. $3\frac{10}{12}$ unc; rostri, $6\frac{2}{12}$; alæ, $2\frac{2}{12}$; caudæ, $1\frac{6}{12}$; tarsi, $\frac{8}{12}$.

Hab. Clarence, Fernando Po.

A small beetle was found in the stomach.

Coccothraustes olivaceus. *Coccoth. capite, collo, pectore, dorso, alarum tectricibus, corporisque lateribus saturatè olivaceo-viridibus; hôc colore ad uropygium, femora et caudam, tectricibus alarum inferioribus, secundariis, rectricumque caudæ apicibus flavis; primariis nigris, ad apicem flavescenti-albis; secundariis in mediâ parte nigris, ad marginem internum albis, ad apicem flavescentibus; rostro tarsisque flavis.*

Long. tot. $7\frac{1}{4}$ unc.; rostri, $\frac{1}{2}$; alæ, $2\frac{3}{4}$; caudæ, 2; tarsi, $\frac{8}{12}$.

Hab. Clarence, Fernando Po.

Nigrita fusconotus. *Nigr. capite, collo, tectricibus caudæ, sic et rectricibus nitidè nigris; dorso, et plumis scapularibus cinereo-fuscis; alis nigrescentibus; corpore inferiore sordidè albo, rostro tarsisque nigris, iridibus e corylo-fuscis.*

Long. tot. $4\frac{1}{4}$ unc.; rostri, $\frac{1}{2}$; alæ, $2\frac{1}{4}$; caudæ, 2; tarsi, $\frac{1}{2}$.

Hab. Clarence, Fernando Po.

Mr. Fraser stated it as his opinion that the bird above described belonged to the *Fringillidæ.* It certainly appertains to the genus characterized by Mr. Strickland in the 'Proceedings' for April 1841, p. 30, under the title *Æthiops.* This genus was founded upon a bird

(*Æthiops canicapillus*) also from Fernando Po, specimens of which Mr. Fraser had obtained and exhibited to the Meeting. Finding the generic name *Æthiops* had been previously used for a genus of Monkeys, Mr. Fraser had been requested by Mr. Strickland to substitute for it the new generic title *Nigrita*. The species described by the gentleman last mentioned will therefore stand as *Nigrita canicapillus*, Strickl.

Amadina Poensis. *Amad. nitidè nigra, primariis guttatis, secundariis uropygio, plumisque lateribus albo-fasciatis; abdomine, tectricibus alarum inferioribus, crissoque albis; iridibus e corylo-fuscis; rostro cæruleo; tarsis nigris.*

Long. tot. 4 unc.; rostri, $\frac{3}{8}$; alæ, 2; caudæ, $1\frac{1}{2}$; tarsi, $\frac{1}{2}$.

Hab. Clarence, Fernando Po.

Very common about Clarence, in flocks of about fifty; their note is 'tweet-tweet.' The young have a brownish cast; they feed entirely upon seeds of the three-forked grass. The sexes do not differ.

Amadina bicolor. *Amad.* (*mas*) *corpore superiore, pectore, et lateribus nigris; abdomine, tectricibus alarum inferioribus, crissoque albis; rostro cæruleo; tarsis nigris.*

Fœm. vel Jun.: colore fusco, fronte genis, guláque nigrescentibus; lateribus et uropygio indistinctè albo-fasciatis.

Long. tot. 4 unc.; rostri, $\frac{3}{8}$; alæ, 2; caudæ, $1\frac{1}{2}$; tarsi, $\frac{1}{2}$.

Hab. apud promontorium Cape Palmas dictum.

A third specimen, which is smaller, is entirely brown, without any indication of the white marks.

Common in the roofs of the huts belonging to the fish-men of Cape Palmas, in which situation they breed and commit much mischief, like our domestic sparrow (*Pyrgita domestica*, Cuv.). The native name is *Saybue*.

This differs from *Amadina Poensis* in the absence, in the adult, of the white markings on the wings, rump, and sides.

Mr. Waterhouse exhibited and described two new species of Mouse, one collected in the Philippine Islands by H. Cuming, Esq., and the other forming part of Mr. Gould's Australian collection.

Mus castaneus. *Mus intensè castaneus, corpore subtùs pallidiore; caudâ corpore cum capite longiore; auribus mediocribus.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	2	7
——————— ad basin auris	0	8
——— *tarsi digitorumque*	0	$7\frac{1}{2}$
——— *auris*	0	$4\frac{1}{2}$
——— *caudæ*	3	0

Hab. ad Insulas Philippinarum.

This little mouse is remarkable for its nearly uniform deep and rich chestnut-brown colour, at least such is the tint it presents in spirits; the under parts of the body are rather paler than the upper; the feet and tail are uniform in hue with the body. Compared with the common mouse (*M. musculus*), it differs in being smaller, in having the rostrum more slender, and the tail proportionately longer.

Mus Novæ-Hollandiæ. *Mus suprà canus flavescente-lavatus; corpore subtùs pedibusque albis; auribus mediocribus; caudâ quoad longitudinem corpus ferè æquante.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	3	0
———— caudæ, circiter	2	0
———— *tarsi digitorumque*	0	$9\frac{1}{4}$

Hab. New South Wales.

This mouse was found, together with two young specimens, under a large slab of bark at Yarrundi, Upper Hunter, New South Wales. In size and colouring it approaches most nearly to the *Mus sylvaticus*, but its tail is considerably shorter than in that animal. In the form of the skull the present species also approaches the *M. sylvaticus*, but the nasal portion of the cranium is shorter; the molar teeth are of the same structure, but apparently rather larger in proportion. The fur is rather long and very soft; on the upper parts the hairs are of a deep grey colour, tipped with brownish yellow; on the belly the hairs are of a less deep grey colour next the skin, and white externally. The tarsi are rather long and slender. The tail is white beneath and dusky above.

November 8.—R. C. Griffith, Esq., in the Chair.

An extract of a letter from the Society's President, the Earl of Derby, was read. His Lordship observes, with reference to some young Rheas hatched in the menagerie, that the eggs were laid in one of his Lordship's paddocks, and were collected into a nest by the male bird, who sat upon them very perseveringly until the keeper, thinking the spot selected was too exposed, removed the eggs and placed them under some Turkeys. They were ultimately, however, placed in Mr. Appleyard's hatching apparatus, and in about a week or ten days were hatched. The letter moreover announces the safe arrival of three Elands (*Antilope Oreas*, Pall.) in his Lordship's menagerie.

A memoir on the anatomy of a species of *Calyptræa* with a ventral shelly valve (*Lithedaphus longirostris*, Ow.), by Prof. Owen, was then read. The normal valve secreted by the *Lithedaphus* resembles a *Calyptræa*, and indeed is possibly a variety of the *Calyptræa equestris* of authors; but the animal is inclosed, like the Acephalous Mollusks, in a bivalve shell. The additional plate, in the present instance, Professor Owen shows to be connected with a modification in the organization of the animal which establishes its claim to a subgeneric distinction among the *Calyptræidæ*. The specimens dissected were collected by H. Cuming, Esq. in the Philippine Islands, and the circumstances connected with this discovery are recorded by that gentleman in the 'Conchologia Systematica' of Mr. L. Reeve (vol. ii. p. 31).

"*Lithedaphus* differs from all previously described *Calyptræidæ* in some well-marked external characters of its soft parts. The head, instead of being short, broad and flat, is long and subcylindrical;

the part anterior to the tentacles being produced in the form of a proboscis, equalling in length the whole body behind it, and terminated by a clavate extremity. The tentacles or antennæ are of proportional length, reaching, in some specimens, to the beginning of the terminal expansion of the proboscis. The second external character is a moderately long subcompressed process, projecting forwards between the head and the anterior margin of the foot, like a second head, but consisting only of a soft duplicature of the mantle, with muscular fibres for protraction and retraction. In some specimens the apex of this process was expanded and a little produced on each side.

"The foot, in the specimens examined, was much smaller in proportion than in *Calyptræa* or *Calypeopsis*; it presents a subcircular form, as in *Cal. Sinensis*, but only equals half the diameter of the entire body*; its whole margin is free, not produced anteriorly into lobes, as in *Calypeopsis*. The dorsal surface of the mantle is impressed with a deep horse-shoe fissure, receiving the internal plate of the upper shell. The aperture of the branchial chamber extends transversely across the back of the head, but conducts to a cavity of unusually small extent. The contained breathing organs differ not merely in relative size, but likewise very remarkably in structure, from the previously dissected *Calyptræidæ*. In these the branchiæ consist of a single series of simple, elongated, close-set and very numerous filaments, extending along the left side of the body in *Calyptræa Sinensis*, and making the tour of the mantle in the *Calypeopsis*. In *Lithedaphus* the branchiæ consist of two short parallel rows of conical, subcompressed, plicated vascular processes, twelve to fourteen in each row, and limited, like the branchial cavity, to the anterior part of the dorsal aspect of the body. The heart, lodged in a wide pericardium, and consisting of a large auricle with thin, subtransparent walls, and a small, opake, conical ventricle, is situated at the left extremity of the branchial chamber, receiving the branchial veins, and sending its largest artery to the ovarium, which, in the specimen dissected, formed the left portion of the visceral mass. The oviduct, at first slender and convoluted, expands on the right side, where it is disposed in three long folds, which were laden with unusually large elliptical ova. At its termination, close to the branchial orifice, there is an oval mucous gland, and a short conical filament projects from the inner surface of the mantle. The proboscis is surrounded by a thick muscular tunic, inclosing a long, rasp-

* It is here described as contracted in specimens preserved in spirit, the specimens of *Calyptræa* and *Calypeopsis* compared with it being in the same state. It is, doubtless, expanded in the living animal, as a thin, muscular and secreting disk over the basal plate. Much sharp criticism has been expended on the genus *Gastroplax*, De Blainville. It was founded in error, no doubt; but future conchologists, who may be tempted to cast a reflection on its author, should remember that he has rendered services to Conchology such as few can hope to rival, and will do well to bear in mind, that the secretion of a shelly valve by the foot of a gastropod is not only a possibility, but is a reality in nature.

like, horny tongue, and at its base are two simple salivary follicles. The œsophagus expands into a small stomach, imbedded in a follicular liver. The intestinal canal is more complicated than in *Calyptræa* or *Calypeopsis*; it bends towards the left side, and there forms a small mass of double spiral coils, five or six in number, from which the rectum is continued along the floor of the branchial chamber, in the interspace of the gills, to the outlet of that chamber on the right side of the neck.

"The nervous system is chiefly distinguished from that of the *Calypeopsis* by the larger relative size and closer approximation of the supra-œsophageal ganglions, which here equal the inferior masses. Besides the chords connecting the upper with the lower ganglions, the upper ganglions give off each three nerves: the largest runs forward in a zigzag course to the clavate mouth; the second supplies the substance of the tentacle; the third, a slender nerve, goes to the minute eye-speck on the outer side of the base of the tentacle. The wavy disposition of these nerves, especially of the rostral pair, clearly indicates a provision for considerable elongation of the parts which they supply.

"Thus the genus *Lithedaphus* differs from the other known forms of the *Calyptræidæ* in the smaller development of its locomotive and respiratory organs, and in the greater development of the organs for the prehension and assimilation of food.

"Probably no oyster, cemented to its native rock, is more fettered in its movements than this highly developed gastropod, to which, however, a voluntary detachment of the foot from the gastric plate may be possible. M. Dufo however testifies that the only movement he was able to recognise in his *Calyptræa Roissii* was an elevation of the anterior part of the shell, and a corresponding separation of it from the supporting plate beneath.

"The circumstances under which Mr. Cuming discovered his specimens would hardly be consistent with a greater extent of motion. The foot, therefore, whose normal functions as an instrument for traversing space must be restricted to the early age of the *Lithedaphus*, may well offer diminished proportions when the animal has chosen a site for the deposition of its ventral plate and has taken up a fixed abode. Muscular action being thenceforward much restricted, the necessity for extensive respiration is in the same degree abolished. The compensation for this abrogation of the power of moving about in quest of food is obviously the great development of the proboscidiform head, which, when outstretched in the living mollusk, must appear like some worm moving to and fro from between the valves of the shell. The tactile organs of sense are co-extended with the prehensile organ; but the eyes, so useful to the young wandering mollusk, have much shrunk in the sedentary aged; and the complete elaboration of whatever nutriment may be introduced into the system has been provided for by the long and convoluted alimentary canal.

"These facts in the anatomy of the *Lithedaphus*, and their harmonious adjustment to its peculiar condition as a sessile gastropod inclosed in a bivalve shell, leave scarcely any doubt as to this state,

strange and anomalous though it may seem, being essential to its nature and of original design.

"For assuming that the secretion of a ventral plate may be excited by some accidental position of an individual of a species not commonly possessing such plate, it would be an extreme hypothesis to attribute to the consequent abrogation of the locomotive power a gradual and progressive elongation of the head, during successive endeavours on the part of the imprisoned mollusk to attain whatever food might come within its reach.

"And admitting that, the supplies of food being casual and scanty, the nutriment would require to be longer retained and more completely assimilated, to conclude that the alimentary canal thereupon acquired additional convolutions, would be still more hazardous. But when we find that, the demands upon the respiratory actions being much diminished after the loss of locomotion, the branchial apparatus does not merely present an atrophied state of its usual structure in the free *Calyptræidæ,* but a different condition of that structure,—two very short gills replacing one very extensive one, and the form of the branchial filaments being quite different,—the conclusion seems unavoidable, that the *Lithedaphus* is a good and constant genus, created with reference to that peculiar mode of life to which its bivalve shell and other generic characters as a Calyptræidan are correlated."

The next paper read was also from Prof. Owen, and contains an account of the anatomy of the *Pholadomya candida.* The genus *Pholadomya* was founded by G. B. Sowerby, upon certain peculiarities observable in the structure of a shell which in some of its characters approaches the genera *Solen, Pholas,* and *Mya.* The animal exhibits the ordinary characters of the *Acephala inclusa* of Cuvier, being everywhere shut up in a mantle which gives issue only to the siphonic tube and the foot; it presents, however, in addition to the pedal and the two siphonic apertures, a fourth orifice, at the under part of the siphon, which is of small size and circular form. This orifice alone, observes Prof. Owen, is sufficient to distinguish the present mollusk from any known genus of the *Inclusa.* It would seem to be an inlet for respiratory currents, supplementary to the ordinary ventral siphon. The animal, compared with that of the *Panopæa australis,* the characters of which are detailed by M. Valenciennes, is distinguishable not only by an accessory bifurcate foot and valvular aperture, but by its undivided branchiæ and some other less marked characters; nevertheless the affinity to *Panopæa,* as indicated by the hinge of the shell, is illustrated by a closer general resemblance of its soft parts to that genus than to *Mya, Solen,* or *Pholas.* These two papers, from the pen of Prof. Owen, and of which the above is a brief abstract, are illustrated with beautifully executed drawings.

Dr. Pfeiffer's descriptions of new species of Shells collected by H. Cuming, Esq. in the Philippine Islands, were then read.

Helix cromyodes. *Hel. testâ imperforatâ, depresso-globosâ,*

tenuissimâ, pellucidâ, olivaceo-fulvâ, apice violaceâ; anfractibus 4 planiusculis, ultimo magno, medio fasciâ latâ albâ cingulato et epidermide tenuissimâ cinerascente fasciatim ornato; columellâ perobliquâ, latâ, albâ; aperturâ lunato-ovali; peristomate simplici, expanso, margine rufo-violascente.

Diam. $1\frac{1}{2}$ poll.; altit. $10\frac{1}{2}$ lin.

Hab. Cagayan, province Misamis of the island Mindanao. Found on leaves of trees.

Helix languida. *Hel. testâ imperforatâ, globosâ, tenuiusculâ, regulariter et confertim obliquè striatâ, apice obtuso lutescente, anfractu ultimo rufo, epidermide hydrophanâ cinerascente indutâ albo-lineolatâ, basi nudo, nitido; suturâ lineâ fuscâ nitidâ, notatâ; anfractibus $4\frac{1}{2}$ convexiusculis; columellâ verticali, albo-callosâ; aperturâ subovali; peristomate . . . . ?*

Diam. et altit. 15 lin.

Two specimens only were found, not yet perfect, on leaves of palms in the island of Siquijor. These resemble some of the varieties of *Bulimus metæformis,* but are more globular.

Helix Bulla, Pf. an Nanina? *Hel. testâ subperforatâ, globoso-depressâ, tenuissimâ, pellucidâ, striis confertis spiralibus et obliquis minutissimè decussatâ, subcarinatâ, pallidè fulvâ, ad carinam rufo-cingulatâ; suturâ vix impressâ; spirâ parùm exsertâ; anfractibus 4 planiusculis; aperturâ lunato-rotundatâ, intùs margaritaceâ, unifasciatâ; peristomate simplici, margine supero introrsùm flexo, columellari vix expanso.*

Diam. 1·60; altit. 0·90 poll.

Hab. Provincia Albay insulæ Luçon.

In form it resembles *Nanina bistrialis,* Beck.

Helix phloiodes. *Hel. testâ imperforatâ, depressâ, solidâ, sub epidermide corticinâ (strigis saturatioribus variegatâ), nitidè nigricanti-rufâ; spirâ subplanulatâ; suturâ profundâ; anfractibus $4\frac{1}{2}$ convexis; columellâ subrectâ, perobliquâ, subexcavatâ; aperturâ latè lunari, intùs lividâ; peristomate incrassato, reflexo, fusco.*

Diam. $14\frac{1}{2}$; altit. 9 lin.

Hab. Argao (island of Zebu): on leaves of trees.

Helix tephrodes. *Hel. testâ imperforatâ, subglobosâ, solidâ, ponderosâ, supernè rufâ, strigis latis epidermidis cinereæ hydrophanæ ferè obductâ, basi stramineâ, rufo-fasciatâ; anfractibus $4\frac{1}{2}$ convexis, supremis depressis, denudatis, rufescentibus; columellâ latâ, albâ, subarcuatâ; aperturâ lunato-orbiculari, intùs albâ; peristomate simplici, reflexo.*

Diam. 19; altit. $15\frac{1}{2}$ lin.

Hab. Sual (province of Pangasinan, Luçon): on leaves of bushes.

Helix unica. *Hel. testâ imperforatâ, globosâ, solidiusculâ, obliquè striatulâ, albidâ; suturâ profundâ; anfractibus $5\frac{1}{2}$ inflatis, supremis planiusculis; columellâ profundè intrante, arcuatâ, subcanaliculatâ; aperturâ perobliquâ, suborbiculari, intùs albâ; peristo-*

mate latè expanso, basi incrassato, intùs fulvido, marginibus approximatis.

Diam. 19; altit. 14½ lin.

Hab. Samboanga, of the island of Mindanao.

This species, of which no more than one specimen was found, is very similar to *Hel. mammilla,* figured by Férussac and by Quoy and Gaimard, but the shell is almost smooth and quite imperforated.

Bulimus cochliodes. *Bul. testâ imperforatâ, turritâ, solidâ, obliquè irregulariter striatâ, apice obtusiusculâ, albidâ; suturâ impressâ; anfractibus 9 planiusculis; ultimo ¼ longitudinis æquante; columellâ subincrassatâ; aperturâ oblongo-ovali; peristomate simplici, recto.*

Long. 2 poll.; diam. 6 lin.

One specimen was found at the island of Cuyo.

Bulimus Cuyoensis. *Bul. testâ subperforatâ, ovato-pyramidatâ, glabriusculâ, nitidulâ, cinnamomeo-fulvidâ, strigis flexuosis pallidioribus et fasciâ unicâ rufescente ornatâ; suturâ lævi; anfractibus 5½ planiusculis, ultimo ⅓ longitudinis vix superante; columellâ brevi, incrassatâ, latè reflexâ; aperturâ ovali; peristomate tenui, parùm expanso.*

Long. 15; diam. 7½ lin.

Hab. Island of Cuyo. One specimen was found, on leaves of trees.

Bulimus effusus. *Bul. testâ imperforatâ, ovatâ, solidiusculâ, obliquè minutissimè striatâ, nitidâ, albâ; anfractibus 5 convexiusculis, ultimo spiram vix æquante; columellâ obliquâ, dilatatâ; aperturâ perobliquâ, lunato-ovali; peristomate simplici, valdè expanso.*

Long. 19½; diam. 14 lin.

Hab. Island of Tablas.

β. Anfractu ultimo subtùs fasciâ 1 fulvâ ornato.

This species resembles somewhat the *Bul. Cumingi,* but it differs in having the shell more solid, the aperture more oblique, the columella oblique and simple, and the last whorl shorter.

Bulimus macrostoma. *Bul. testâ imperforatâ, ovatâ, solidiusculâ, rufo-nigricante, apice pallidiore, epidermide hydrophanâ fuscâ indutâ, lineis nigris circumdatâ; anfractibus 6 convexiusculis, ultimo spiram subæquante; columellâ verticali, dilatatâ, medio subincrassatâ; aperturâ latâ, lunato-ovali, intùs albâ; peristomate expanso, subincrassato, intùs saturatè fusco, margine dextro valdè arcuato.*

Long. 30½; diam. 19½ lin.

Hab. Dolores, province of Pampanga, in the island of Luçon: found on trunks of trees.

β. Anfractu ultimo medio bifasciato, fasciâ superiore angustâ, nigrâ, alterâ adnatâ latiore, albidâ.

Long. 34; diam. 22½ lin.

From Sual (island of Luçon): on leaves of trees.

Bulimus Romblonensis. *Bul. testâ imperforatâ, ovato-pyramidatâ,*

tenui, striis obliquis et transversis confertis obsoletè decussatâ, albidâ, rufo-trifasciatâ, epidermide hydrophanâ deciduâ, liberâ, præsertìm in fasciis, maculatâ; anfractibus 6½ planiusculis, ultimo ⅓ longitudinis vix superante; columellâ subrectâ, angustâ, planatâ; aperturâ ovali; peristomate simplici, subexpanso.

Long. 2 poll.; diam. 11½ lin.

Hab. The island of Romblon, on leaves of trees. It is perhaps an *Achatina.*

Bulimus solidus. *Bul. testâ imperforatâ, ovato-oblongâ, solidâ, obliquè striatâ, saturatè rufâ, epidermide fusco-albâ irregulariter strigatâ; spirâ conicâ, sursùm pallescente; anfractibus 7 vix convexiusculis, ultimo spirâ paulò breviore; columellâ rectâ, basi subintortâ; aperturâ auriformi, lateraliter subeffusâ, intùs albidâ; peristomate subreflexo, intùs rufo-nigricante, marginibus callo lato tenui junctis.*

Long. 41; diam. 21½ lin.

Hab. S. Juan, province of Cagayan (island of Luçon).

Var. testâ magis inflatâ, anfractu ultimo medio albido-fasciato.

Long. 39; diam. 22½ lin.

Hab. Sual, province of Pangasinan (island of Luçon).

Bulimus subcarinatus. *Bul. testâ imperforatâ, pyramidatâ, tenui, striis obliquis et spiralibus confertissimis minutè decussatâ, albidâ, diaphanâ, epidermide fuscescente, hydrophanâ irregulariter strigatâ, ad suturam fasciâ pallidè fulvescente ornatâ; anfractibus 6½ planiusculis, ultimo ⅔ longitudinis subæquante, obsoletè carinato; columellâ rectâ, planâ, angustâ; aperturâ oblongo-subtetragonâ, intùs albâ; peristomate simplici, parùm expanso.*

Long. 22½; diam. 12½ lin.

Hab. The island of Romblon, on leaves of trees.

Bulimus uber. *Bul. testâ imperforatâ, ovatâ, apice obtusâ, tenui, subdiaphanâ, lutescenti-albidâ, obliquè regulariter et confertìm striatâ; spirâ semiglobosâ; suturâ impressâ, albo-marginatâ; anfractibus 4 inflatis, ultimo spiram superante; columellâ subrectâ, propè basin subincrassatâ; aperturâ ovali; peristomate simplici, latè expanso.*

Long. 24½; diam. 16 lin.

Hab. The island of Guimaras, on leaves of trees.

Bulimus virens. *Bul. testâ imperforatâ, ovato-pyramidatâ, tenui, læviusculâ, nitidâ, albâ, anfractu ultimo pallidè viridi; anfractibus 7 planiusculis, ultimo ⅓ longitudinis vix superante, obsoletè angulato; columellâ subrectâ, propè basin subincrassatâ, albâ; aperturâ obliquâ, lunato-ovali; peristomate recto, vix incrassato.*

Long. 27; diam. 14½ lin.

Hab. Island of Burias: on leaves of trees. In form it resembles *Bul. carinatus,* Lea.

November 22.—William Yarrell, Esq., Vice-President, in the Chair.

The following paper, by M. C. A. Récluz, entitled "Descriptions of various species of *Navicella,* collected by Mr. Cuming in the Phi-

lippine Islands," was communicated by H. Cuming, Esq., Corresponding Member, who exhibited specimens to the Meeting in illustration of the descriptions.

The longitudinal diameter of the *Navicellæ* described in this catalogue has been taken from the anterior to the posterior side, and the transverse diameter from the summit to the base of the external opening, in its broadest part.

1. Navicella Janelli, *Récluz*, Revue Cuviérienne, 1841. p. 376. No. 9.

Var. *α*. *Testâ ellipticâ, convexâ, crassiusculâ, vix cancellatâ, lineis nigris reticulatâ, interstitiis lutescentibus.*

Var. *β*. *T. lineis nigris supernè reticulatis, anticè remotiusculis, subæquidistantibus; aperturâ margine cinereo-nigrescente, in fundo aurantiâ, interdum nigro-maculatâ.*

Var. *γ*. *T. dorso nigro latè pictâ et maculis concoloribus variegatâ, anticè lineis nigris radiatâ, posticè densè lineolatâ; labio lateraliter emarginato, medio subproducto ac rectiusculo.*

Var. *δ*. *T. lutescente, dorso transversim latè et remotè nigro undatâ; zonis interdum anticè conico-angulatis.*

Var. *ε*. *T. orbiculari, dorso nigerrimâ, maculis lutescentibus sparsis notatâ, margine brevè lineatâ, posticè lateraliter, interdum luteo-viridescente; aperturâ margine cinereo-nigrescente.*

Dimensions.—Var. *α*, 1·80 poll. longa; 1·28 ad 1·40 lata; 0·76 ad 0·80 convexa. Var. *ε*, long. 1·20 ad 1·40; lat. 0·96 ad 1·08; conv. 0·48 ad 0·52 poll.

Hab. ad Insulas Philippinas. Var. *α* and *γ* from Agoo, province of Pangasinan, island of Luçon: on stones in a rapid river. The var. *β*, *δ*, and *ε*, from Iba, province of Sambales, island of Luçon: on stones in a deep river.

The only difference I find between the varieties brought from the Philippine Islands and those from Guam (of which I have only been able to examine a single specimen) is, that the former are rather more solid and more convex. As to form and colour, they are too variable to dwell upon.

The operculum of this *Navicella* has particular characters, which it is important should be known, as confirming the specific value of this shell.

Operculum almost square, rather longer than broad, subconvex above, of a light bluish black mingled with flesh-colour, striated upon the surface and upon the anterior side, divided by a broad and shallow canal, ending in a deep and wide anterior notch, which is cut square at the base. The canal and notch are bounded on the right by a smooth, linear, flesh-coloured rib, which is a little prolonged and truncated at the end with a furrow throughout its length. The left side of its inferior surface is striated above, sinuous at the margin and finely denticulated at its base, which is of a rosy red.

2. Navicella variabilis. *N. testâ ellipticâ, striis vix sub lente cancellatâ, lineolis transversis undulatis obsoletisque sæpiùs confluentibus olivaceis et maculis lutescentibus nigrescente anticè obumbratis*

variegatâ; apice marginali eroso, retusissimo; labio albo, posticè aurantio, margine subrecto; aperturâ albido-cærulescente.

Long. 1·16 ad 1·28; lat. 0·80 ad 0·84; conv. 0·46 ad 0·54 poll.

Var. β. *T. ovatâ, posticè subtruncatâ, tenuiusculâ; apice ante marginem inserto, deroso.*

Long. 1·24 ad 1·28; lat. 1·10 ad 1·14; conv. 0·52 ad 0·56 poll.

Hab. Cagayan, province of Misamis, island of Mindanao: found on stones in a large river.

Although these two varieties appear to differ from each other in the position of the summit, I do not think they can be separated. Nevertheless the operculum varies perceptibly, and if their respective characters proved constant, which it would be necessary to verify by examining a certain number of specimens, then alone could one be distinguished from the other. The surface of this *Navicella* shows upon the anterior side longitudinal striæ, as deeply impressed as the transverse ones.

The operculum of the type is blackish throughout, except at the base, which is of an orange-red. The anterior side is notched. The dental apophysis is linear, smooth, a little raised, faintly striated both longitudinally and transversely. The external margin of this tooth projects but little, and its inferior part shows the commencement of a crest, but without teeth.

The operculum of the variety is of a rosy colour, with the inferior margin of an orange-red; the anterior side is more slightly notched in the middle, its dental apophysis projects rather more, and is linear, smooth, and divided by a longitudinal groove. The external margin of this tooth is narrow, without any trace of a denticulated crest at its base.

3. Navicella suborbicularis. Sowerby, Cat. Tank. App. p. 10. No. 1092; Récluz in Guérin, Rev. Cuv. 1841. p. 377. No. 10.

Var. β. Récluz, l. c.; Rumph. Mus. Amb. p. 40. f. 0. Optime.

Var. γ. Minori, tenuiori.

Hab. ad Insulas Philippinas. From the island of Camiguing: found on stones in mountain-streams. Var. β, from Cagayan, province of Misamis, island of Mindanao: on stones in a large river. Var. γ, from Banguey, province of North Ylocos, island of Luçon: found on stones in a small stream.

I see neither in the general form nor in the operculum of these varieties any character sufficient to distinguish them from the type: the colour alone is variable.

The operculum is of a pale flesh-colour, flattened with an arched notch at the anterior side. The apophysis projecting, smooth, a little more arcuated than that of the operculum of *Nav. Janelli*; its external margin is narrower, almost straight, finely crenulated in its lower half. The posterior border is very thin and of a dirty red.

4. Navicella Luzonica, Souleyet. *N. testâ ellipticâ, rufo-fuscâ seu olivaceâ unicolori seu nigro obsoletè reticulatâ aut punctatâ, lateribus compressiusculâ, dorso valdè convexâ, solidâ; apice ad marginem posteriorem incurvo, subintegro ac eroso; labio semi-*

lunari aurantio, anticè rectiusculo; aperturâ albido-cærulescente, margine posteriore laterali nigrescente.

Nav. Luzonica, Souleyet, Rev. Cuv. 1841. p. 375. No. 6. *Junior.*

Var. β. *T. olivaceo-fuscescente, maculis minimis lutescentibus vix nigrescente marginatis irroratâ.*

Var. γ. *T. rufo-fuscâ immaculatâ; apice deroso, convexo.*

Var. δ. *T. rufo-fuscâ, posticè tenuissime nigro et lutescenti longitudinaliter lineolatâ, maculisque minimis lutescentibus conicis nigromarginatis, obsoletisque (sub lente) pictâ.*

Var. ε. *T. rufo-fuscâ, inter oculum et laminam maculis minimis subnigrescentibus adspersâ.*

Var. ζ. *T. minori, tenuiori, olivaceâ, posticè lineolatâ, suprà nigro tenuissime reticulatâ, anticè maculis squamiformibus pictâ, labio stramineo, nigrescente circumvallato.*

Long. 1·28 ad 1·60; lat. 0·84 ad 1·12; conv. 0·52 ad 0·76 poll.

Hab. From Dingle, province of Ylo Ylo, island of Panay: found in a placid river on stones. The var. γ and δ from Cagayan, province of Misamis, island of Mindanao: on stones in a large river. Var. ε, from the mountains of the island of Negros: found on the rocky bed of a small stream.

The individual which served as type to M. Souleyet was young, and had been brought home in spirits of wine, which hindered him from seeing the black lines which adorn the external surface of this *Navicella*. There is then no difference between his specimen and these of Mr. Cuming.

The operculum of this *Navicella* is rose-coloured, clouded with white and blue, but the rose-colour predominates. The notch of its anterior portion is somewhat rounded; its subarcuated apophysis bears a longitudinal groove more or less impressed; the external margin of this apophysis is tolerably large, and rather concave below the middle, at the usual origin of the crest, which is wanting in this species. The inferior or internal surface is of a pale flesh-colour, with a blackish tint on its left margin. The muscular impression is rose-colour, very shining, almost square, truncated anteriorly and upon the left side, somewhat rounded at its base, straight and oblique on the right side, with an acute angle at its base.

This operculum varies in form and colour; its notch in one individual had the form of a Λ, or profoundly acute; in others it was very open: some are altogether rose-coloured, others rosy on one side, yellow on the other, and blackish in the middle; others again almost entirely of a bluish tint, and mingled with these various colours.

The summit, sometimes almost entire or decorticated only, is at other times entirely eroded at its inferior surface; it is prolonged upon the posterior margin of the opening, though not beyond, and there it is worn away, as if it had been rubbed upon a grindstone.

5. Navicella Cumingiana. *N. testâ orbiculari seu ovatâ, convexâ, solidâ, vix striatâ luteo-fuscescente, lineis concentricis nigris undulatis arcuatisve interdum reticulatis cinctâ; apice marginali*

eroso, retuso; labio plano, albo, anticè in medio producto ; aperturâ albâ, cordiformi.

Var. *β. T. nigro-reticulatâ, lutescente maculatâ et subfasciatâ.*

Var. *γ. T. ovato-ellipticâ, dilutè olivaceâ, posticè lineolis nigris transversis, interdum majoribus et remotis notatâ.*

Hab. Var. *a* et *c* from a mountain-stream in the island of Camaguing. Var. *β* from Cagayan, island of Mindanao.

Long. 1·00 ad 1·20; lat. 0·84 ad 0·92; conv. 0·40 ad 0·56 poll.

The columella is 0·24 to 0·28 poll. in diameter.

Operculum irregularly oval, of an uniform white or rayed with rose-colour above, profoundly notched anteriorly; the notch rounded at its base. The apophysary rib is only apparent at the anterior summit of the operculum; it projects but little, and is nearly acute. Its external margin is oblong, very thin and very smooth; the left or opposite margin is striated, somewhat imbricated above, and crenulated throughout its extent. The inferior surface is of a pale uniform flesh-colour. The subrotund or oboval muscular impression is of a rose-red anteriorly, and of a dark red at the base. Upon the operculum of the var. γ the left margin is completely wanting, which gives an oblong and a subtriangular form to the muscular impression. These characters are only accidental.

I have dedicated this interesting species to Mr. Cuming, whose numerous discoveries in natural history have enriched science with a crowd of new facts, as a testimony of my esteem.

6. Navicella Clypeolum. *N. testâ ovato-oblongâ, anticè et posticè rotundatâ, tenuè et concentricè striatâ, lineolis nigro-violaceis seu purpurascentibus, interdum confluentibus et maculis albido-lutescentibus oblongis elongatisve nigro-marginatis sub-serialibus et passim radiis pallidis binis pictâ; apice brevi ad dextram vix obliquante, ante marginem posito; labio semilunari, convexiusculo, fuscescente; aperturâ patulâ.*

Var. *β. T. olivaceo-nigricante, maculis obsoletis; apice eroso; labio latiore, carneo, in medio subproducto, recto.*

Var. *γ. T. olivaceâ, lutescente maculatâ, in medio ventre obsoletè biradiatâ; apice purpurascente, labio fuscescente.*

Var. *δ. T. atratâ, immaculatâ; apice eroso; labio et margine aperturæ carneo-fuscescentibus.*

Var. *ε. T. nigrescente lineolatâ pallide virescente radiatâ et maculatâ, apice submarginali roseo, integerrimo.*

Var. *ζ. T. fuscescente maculis linearibus albidis nigro acutè marginatis obsoletis sparsis variegatâ; apice purpurascente; labio et margine aperturæ dilutè fuscis.*

Long. 0·80 ad 1·32; lat. 0·76 ad 0·92; conv. 0·24 ad 0·48 poll.

Hab. Var. *β* and *γ* from Cagayan. Var. *a* and *ε* from Banguey, province of North Ylocos, island of Luçon: found on stones in a mountain stream. Var. *γ*, island of Guimaras, on the rocky bed of a small stream. Var. *δ*, rocky bed of a stream in the mountains of the isle of Negros. The type itself is found at Pasuguing, province of North Ylocos, island of Luçon.

Operculum almost square, thin, of a rose-colour, cut squarely an-

teriorly, with a projecting, obtuse, linear tooth, which is divided by a slightly impressed longitudinal groove; the right margin very narrow, very thin, and without crest.

It is possible that this species may prove only a stronger, more robust state of the *Nav. tessellata*; nevertheless it differs in its general form, and its operculum also shows some differential characters.

7. NAVICELLA TESSELLATA, Lamarck.

Var. α. *T. lateribus angustatâ, subrectis; sub epidermide lutescente lineolis violaceis seu purpureis creberrimis, et maculis conicis concentricè seriatis pictâ; vertice recto, luteo; labio triangulari, anticè subarcuato, lateribus prolongato.*

Var. β. *T. ut in var. α, sed posticè subemarginatâ, griseo-fuscâ, maculis minoribus luteo-fuscescentibus conicis crebrè pictâ; apice dilutè purpurascente, recto; labio subtriangulari, angusto, roseo, anticè arcuato.*

Var. γ.? *T. oblongo-ellipticâ, anticè et posticè rotundatâ, crassiore sive oblongo-acutâ, lateribus angustatâ, nigerrimâ, apice eroso; labio semilunari, interdum triangulari, latiore, subrecto, lateribus non prolongatis.*

An *Nav. Clypeolum*, var.? credo, sed difficile est probandi sine operculo.

Long. 0·80 ad 0·92; lat. 0·76 ad 0·92; conv. 0·24 ad 0·48 poll.

Hab. Var. α, Cagayan: found in a large river on stones. Var. β, from Baccara, province of North Ylocos, island of Luçon: found on stones in a placid river. Var. γ.?, from Abulug, province of Cagayan, island of Luçon: found on stones in a large river.

Operculum square, a little elongated, narrow, and cut almost square anteriorly, with a slight notch towards the apophysis, which is slightly curved inwards (instead of being straight or turned backwards, as in that of *Nav. clypeolum*). The inclined angle of the middle of the left side is deeper, and in this species shows a depression or broad canal, in form of a Λ, the whole length of the apophysis; this canal is limited to the left by two slightly raised ribs.

These characters of the operculum, if they be constant, should suffice to avoid all confusion of this species and the one which precedes.

8. NAVICELLA LINEATA, Lamarck.

Var. α. *T. oblongâ, posticè acutâ, luteo-aureâ, supernè lineis spadiceis radiantibus ex lineolis transversis obumbratis, anticè et lateraliter maculis oblongo-conicis subserialibus pictâ; apice lateraliter compresso, suprà fornicato, roseo-purpurascente recto, marginali; labio angusto-triangulari, medio concavo-emarginato, lateribus anticè prolongatis.*

Var. β. *T. ellipticâ, posticè angustatâ, luteâ medio dorsi lineis nigris angustis et latiusculis, et lineolis obliquis creberrimis radiis latioribus lateraliter efformantibus interdum confluentibus pictâ, labio triangulari anticè arcuato.*

Var. γ. *T. oblongâ, posticè angustâ, subacutâ, luteâ radiis angustis nigris medio dorsi notatâ, anticè et lateraliter crebrè nigrescente*

lineolatá, et maculis linearibus luteis subseriatis pictá; apice subviolascente; labio triangulari, anticè arcuatim excavato.

Var. δ. *T. elongatá, lateribus compressá, dorso convexo-fornicatá, anticè subacuto, interdum truncato; luteo-fuscescente, maculis oblongis anticè nigris acutis lateraliter lineolis tenuissimis obsoletisque obumbratis pictá; apice interdum nigrescente, labio triangulari, luteo-fuscescente.*

Var. ϵ. *T. oblongo-ellipticá, lateribus compressâ, lineolis pallide fuscis aut purpurascentibus, et maculis oblongo-conicis luteis pictá; radiis binis, pallide luteis in medio dorsi notatá; labio triangulari, anticè arcuato.*

Var. α: long. 0·88 ad 1·08; lat. 0·44 ad 0·56; conv. 0·24 ad 0·48 poll. Var. β and γ: long. 0·96 ad 1·04; lat. 0·60 ad 0·64; conv. 0·32 ad 0·36. Var. δ: long. 0·52 ad 0·64; lat. 0·32; conv. 0·28 ad 0·32.

Hab. Var. α, from Banguey, province of North Ylocos: on stones in a mountain-stream. Var. β, from Cagayan: on stones in a large river. Var. δ, from Baccara: on stones in a rapid river. Var. ϵ. ?, cum præcedenti.

All these varieties are very remarkable, and, with the exception of var. ϵ, whose operculum I have not seen, all certainly belong to the same species. The operculum of *Nav. lineata* is oblong, very thin, pale yellow, a little inclined to pale green, rounded behind, notched before, notch in an oblique line at the base. The left side of this operculum is slightly arcuated in the centre; the right side almost rectilinear and limited by an apophysary tooth, very narrow and a little prolonged anteriorly. Muscular impression triangular, elongated, inclined obliquely to the left.

9. Navicella Entrecastauxi, Récluz. Rev. Cuvier. p. 380, No. 14.

Var. β. *T. obovatá, nigro-purpurascente, concentricè et crebrè lineolatá, maculis luteis conicis aut subquadratis pictá; apice purpurascente marginali, non exserto; aperturá albido-cærulescente.*

Long. 0·80 ad 0·90; lat. 0·56 ad 0·60; conv. 0·20 ad 0·28 poll.

Hab. ad insulas Philippinas.

Operculum almost square, of the form and sculpture of that of *Nav. tessellata*, offering however some characters which the state of that which was submitted to me does not allow me to judge of with certainty. Its colour is of a rosy white, and yellow in the centre. It is possible that the *N. Entrecastauxi* may prove only an oboval variety, with a marginal summit of *N. tessellata*. When I shall have seen a greater number of specimens with their opercula I may be enabled to pronounce with more certainty.

It results from this examination of the *Navicellæ* collected by Mr. Cuming, together with those I have had an opportunity of studying up to the present time—1st, that the number of known species of this genus amounts at present to eighteen; 2ndly, that the Asiatic Islands is that part of the world which contains the greater number of species; and 3rdly, that Polynesia is afterwards the most rich locality in species of this genus.

MISCELLANEOUS.

ON SUBSTANCES INCLOSED IN AGATE.

To Richard Taylor, Esq.

Bulford, June 6, 1843.

Sir,—I send you a sketch of some bodies contained in a brownish agate which I have, so nearly resembling those represented in the plate illustrating the paper by Karl Mueller, M.D., translated and communicated by the Rev. M. J. Berkeley *, that I cannot resist troubling you with my ideas on the nature of those bodies represented in figure 10 of your plate. Many of those in my agate are precisely of similar forms, but I have only figured those which illustrate my idea of their nature.

I believe them to be imperfectly formed crystals, probably of red oxide of iron, as their colour is so precisely similar to that substance.

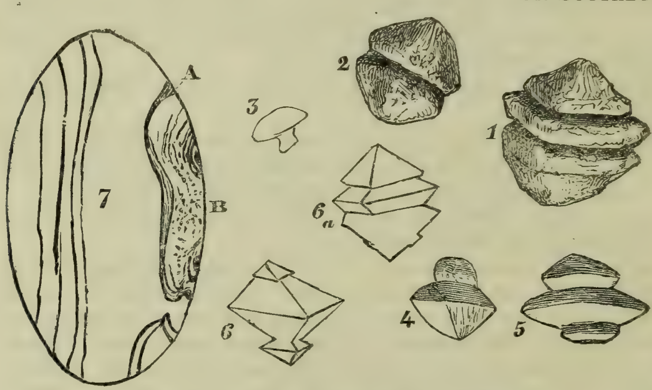
No. 1. is, I think, evidently an imperfectly formed octohedron with rounded edges, or rather several imperfect crystals of that form superimposed on each other, as represented at figure 6 and 6 *a*.

The other figures more nearly resemble the figures in your plate.

No. 4. shows an imperfect facet, but the lines bounding the angles of the crystal in all the other figures are curvilinear, and give them a rounded appearance.

The general description of the bodies seen by M. K. Mueller so nearly tallies with those in my agate, that I can scarcely doubt of their identity. Your obedient servant,

A. Southby.



DESCRIPTION OF WOODCUTS.

Figs. 1, 2, 3, 4, 5. Various bodies contained in the agate 7 at B.
Fig. 7, A. A band in the agate composed of red matter, evidently of the same substance of which 1, 2, 3, 4, 5 are formed.
Figs. 6 and 6 *a*. represent a crystal which shows some general resemblance to the bodies figured above.

ON THE DEVELOPMENT OF THE CRAY-FISH. BY M. JOLY.

Encouraged by the Academy of Sciences to continue my researches on the freshwater Crustaceans, I first devoted my attention to the embryogeny of the cray-fish, *Astacus fluviatilis*, Gesner, on

* See Annals, vol. xi. p. 415. Plate X.—Ed.

which subject Dr. Rathke and Mr. J. V. Thompson have pronounced such decided, but altogether contradictory, opinions. Thanks to the kindness of some friends of science, I have been able to obtain a considerable number of females, and to follow, day by day, the development of the embryo in the egg. I hasten to announce that my observations agree entirely with those of the learned naturalist of Dantzig, which have moreover already been confirmed by the testimony of M. Duvernoy.

However contrary this fact may be to the views which I sought to establish in my memoir on *Caridina Desmarestii,* I lose no time in publishing it.

The remarkable exception which the absence of metamorphosis in the *Astacus fluviatilis* presents, may, in my opinion, obtain an explanation, which I submit to the judgement of the Academy. According to the observation of M. Duvernoy, the eggs of the cray-fish are in small number, but of very large size compared to that of the animal. Those of the lobster (*Cancer Homardus*), of the spiny lobster (*Cancer gammarus*), and of the greater part of the other Decapods, are, on the contrary, small and very numerous. The former, consequently, would contain a quantity of vitellus sufficient to enable the complete development of the embryo to take place in their interior: the latter, being placed under totally different circumstances, would only admit of an imperfect development of the animal, which would break its envelope prematurely in order to complete its embryonal life amidst the waters*.—*Comptes Rendus* for July 3, 1843.

SALIX CUSPIDATA.

The Rev. W. A. Leighton found this tree some years since near Shrewsbury, but was unable to meet with it again. A few days since Mr. Leighton and I had the pleasure of again finding two trees of it (probably the same seen before) at about 5½ miles from Shrewsbury, by the side of the road to Pontesford. We had not time to go nearer to the hills in search of it, but I think it highly probable that a careful search will prove its existence in that district. This is the tree that is called *S. Meyeriana* in Leighton's 'Flora of Shropshire,' but referred with apparent reason to *S. cuspidata* by Koch in the 'Syn. Fl. Germ.'—C. C. B.

OCCURRENCE OF THE GREAT SPOTTED CUCKOO.

To the Editors of the Annals of Natural History.

Gentlemen,—The *Cuculus Glandarius*, or Great Spotted Cuckoo, was taken near Clifden in the county of Galway last spring. I have seen the specimen, which is the property of Mr. Creighton of Clifden. As it is the first noticed occurrence of this bird in the British Islands, you will oblige me by making it known through the medium of the 'Annals of Natural History.'

Very truly yours,

Granby Row, Dublin, July 19, 1843. R. Ball.

* Dr. Rathke's recent observations on the development of the Decapod Crustacea, with which the author does not seem to be acquainted, will be found at p. 263 of the sixth volume of this Journal.—Ed.

LETTERS FROM RAY TO SIR HANS SLOANE.

On drawing toward the completion of his Supplement to the 'Historia Plantarum.' His remarks on Plukenet's 'Almagestum Botanicum.'
[MS. Sloan. Brit. Mus. 4056. fol. 157. *Orig.*]

Black Notley, July 17, —96.

Sir,—Since my last to you, considering my infirmities, and crazinesse admonishing me of the near approach of Death, I think it best to speed the finishing and fitting my Supplement for the Presse, and to deliver it up into the Bookseller's hand who put me upon it, to be published or suppressed, as he shall find it most for his own interest. I am sensible that it must needs be a very weak and imperfect thing, I wanting those helps which those that have travell'd into the Indies and live about London have. But yet none so fit to make a Supplement to my own History as my self; and there be many faults I am advised of, which I would willingly correct. But I would fain dispatch it and rid my hands of it, that so it may be no disturbance to my thoughts. Your History, were it reasonable for me to beg the defloration of it, would afford the greatest ornaments to it. But I am almost come to a resolution not to desire any such thing of you, but content my self with the names I find in your Catalogue of such as are non-descripts; and with your Synonyma for the reducing of such as are repeated.

I have gotten a sight of Dr. Plukenet's Almagestum Bot. though as yet he hath not presented me with a copy of it. I find in it many mistakes in the language, and in the composition of Greek names; and I doubt not but there are many in the matter. It is impossible but that a man who relies wholly upon dried specimens of Plants (be he never so cunning) should often mistake and multiply. He hath abundance of Jamaica plants, which if in your Catalogue it is very difficult to reduce them, especially his Felices. As far as I am able to judge, he is often out in his conjectural Synonymes: in one or two he is reprehended by Mons^r^. Tournefort; and is of himself apt enough to multiply species. But no more of him.

I am not yet quite rid of my distemper: I hope it will off by degrees: heer hath been a very unseasonable Summer, for the most part very cold and wet; and I live in a sharp Air, my house standing on a hill exposed to the North and North-East winds, which is inconvenient for one who is subject to colds, and whose lungs are apt to be affected. Excuse this *periautology*, and take me to be, as really I am, Sir,

Your much obliged friend and humble servant,

John Ray.

I must not forget my Wives service, who is very much yours.

For Dr. Hans Sloane, at his House at the corner of Southampton Street, next Bloomsbury Square, London.

On the rudeness of Tournefort toward him in his 'Elémens de Botanique.'
[Ibid. fol. 219. *Orig.*]

Sir,—I have been so interrupted and disturbed lately that I have not been able to finish the two Tribes you last sent me. I presume Mons^r^. Gundelcschmir since his return to London hath acquainted

you that he hath been with me. He endeavoured to excuse Mons[r]. Tournefort, and to vindicate him from the imputation of rudenesse and incivility in his treating of me in his Elem. Botaniq. wherewith he hath been charged. I can easily passe it by, because he hath treated me no worse than I deserve. But truly his Method, considering it with all the indifference I can, seems to me faulty and liable to many exceptions, and as for what he hath written against my Dissertation it admits in most particulars of an easy answer, as I may afterward shew. I own him to be a skilfull Herbarist, and had he let me alone, I should not have opposed his method, but permitted every one his freedome to embrace and follow what seemed best to him: only I might have corrected the errours of mine own, as many as I know of, and set it in as good a light as I could. I hope you will, I doe not say take the liberty, but doe me the favour to correct whatever you find amisse in my Supplement, and to adde, cut off, and alter whatever you observe to be deficient, redundant, and incongruous or erroneous. I remember I was in some places doubtful about your meaning, and therefore probably might mistake it.

My Wife presents her humble service to you, and we both many thanks for your intended Present of Sugar, which we can hardly without violation of modesty receive at your hands. You doe *beneficia beneficiis cumulare*, and even load us with your kindnesse. I cease to give you further trouble, and rest, Sir,

Your very affectionate friend and humble servant,

Black Notley, April 27, —98. JOHN RAY.

For his honoured friend Dr. Hans Sloane, at his House at the corner of Southampton Street, towards Bloomsbury Square, London.

METEOROLOGICAL OBSERVATIONS FOR JUNE 1843.

Chiswick.—June 1. Cloudy and fine. 2. Rain: dense clouds: boisterous, with rain at night. 3. Cloudy and fine: clear. 4. Very fine. 5. Fine: heavy showers: clear. 6. Showery. 7. Fine: rain. 8. Cloudy: showery: boisterous, with heavy rain at night. 9. Cloudy and windy: boisterous, with showers and bright sunshine at intervals. 10. Fine: rain. 11. Cloudy and fine. 12. Hazy clouds: rain. 13. Heavy rain. 14. Foggy: cloudy: foggy at night. 15. Hazy: fine. 16—18. Very fine. 19. Overcast. 20. Cloudy. 21, 22. Very fine. 23. Cloudless, with bright sun. 24. Slight haze: fine. 25. Densely overcast. 26. Very fine. 27. Sultry, with hot dry air. 28. Cloudy and fine. 29, 30. Overcast and fine.—Mean temperature of the month about 4° below the average.

Boston.—June 1. Cloudy: rain early A.M. 2, 3. Cloudy: rain P.M. 4. Fine: rain P.M. 5, 6. Fine. 7. Cloudy. 8, 9. Windy: rain early A.M. 10. Windy. 11. Cloudy: rain P.M. 12. Windy. 13. Windy: rain P.M. 14, 15. Fine. 16. Fine: curious halo round the sun 2 to 4 P.M. 17, 18. Cloudy. 19, 20. Windy. 21—23. Fine. 24—28. Cloudy. 29. Windy. 30. Cloudy.

Sandwick Manse, Orkney.—June 1. Bright: damp. 2. Cloudy: drizzle. 3. Rain: showers. 4. Cloudy. 5. Bright: clear. 6. Bright: cloudy. 7. Cloudy: clear. 8. Rain: clear. 9. Damp: drizzle. 10. Showers. 11. Showers: damp. 12. Bright: cloudy. 13. Cloudy: fine. 14. Fine. 15—17. Fine: warm. 18—20. Cloudy. 21. Showers: cloudy. 22. Clear: cloudy. 23. Cloudy: drizzle. 24. Bright: fine. 25. Bright: clear. 26. Bright: cloudy. 27, 28. Cloudy. 29. Drops: showers. 30. Cloudy: damp.

Applegarth Manse, Dumfries-shire.—June 1. Wet all day. 2. Slight showers: warm. 3. Wet nearly all day. 4. Fair and cold. 5. Rain all day. 6. Fair, but cloudy. 7. Rain: thunder. 8. Rain. 9. Showers. 10. Dry and windy. 11—23. Fair and clear. 24. Fair and clear: thunder. 25—28. Fair and clear. 29, 30. Fair and clear: cloudy.

Meteorological Observations made at the Apartments of the Royal Society, LONDON, *by the Assistant Secretary,* Mr. Roberton; *by* Mr. Thompson *at the Garden of the Horticultural Society at* CHISWICK, *near London; by* Mr. Veall, *at* BOSTON; *by the* Rev. W. Dunbar, *at Applegarth Manse,* DUMFRIES-SHIRE; *and by the* Rev. C. Clouston, *at Sandwick Manse,* ORKNEY.

Days of Month. 1843. June.	Barometer. London: Roy. Soc. 9 a.m.	Barometer. Chiswick. Max.	Barometer. Chiswick. Min.	Barometer. Boston. 8½ a.m.	Barometer. Dumfries-shire. 9 a.m.	Barometer. Dumfries-shire. 9 p.m.	Barometer. Orkney, Sandwick. 9½ a.m.	Barometer. Orkney, Sandwick. 8½ p.m.	Thermometer. London: R.S. Fahr. 9 a.m.	Thermometer. London: R.S. Self-reg. Mx.	Thermometer. London: R.S. Self-reg. Min.	Thermometer. Chiswick. Max.	Thermometer. Chiswick. Min.	Thermometer. Boston. 8½ a.m.	Thermometer. Dumf.-shire. Max.	Thermometer. Dumf.-shire. Min.	Thermometer. Orkney, Sandwick. 9¾ a.m.	Thermometer. Orkney, Sandwick. 8½ p.m.
1.	29·716	29·669	29·504	29·04	29·48	29·30	29·74	29·58	61·3	67·6	56·3	67	51	62	55	43	48½	46
2.	29·336	29·305	29·224	28·75	29·18	29·03	29·45	29·45	57·3	67·3	56·0	66	52	61	62	50	49½	43
3.	29·486	29·575	29·467	28·90	29·20	29·44	29·46	29·72	59·2	66·3	53·8	68	43	59·0	50½	45	40½	40½
4.	29·700	29·639	29·223	29·14	29·63	29·73	29·93	30·05	62·5	69·3	52·2	68	38	61	53½	42	45	42
☽ 5.	29·850	29·785	29·780	29·25	29·74	29·77	30·05	30·08	57·3	71·3	48·5	68	39	59	48½	41½	48	45
6.	29·840	29·861	29·789	29·31	29·80	29·79	30·04	29·97	56·2	79·0	48·4	60	43	59	55	41	49	47
7.	29·950	29·896	29·671	29·27	29·67	29·30	29·75	29·52	56·7	66·3	47·6	64	50	56·5	57	45	49	44
8.	29·454	29·407	29·256	28·86	28·96	28·85	29·09	29·03	58·7	61·2	51·7	65	50	60	58	49	51	49
9.	29·422	29·642	29·346	28·82	28·90	29·21	29·06	29·23	60·3	67·7	53·0	63	49	58	58	48	50	49
10.	29·816	29·937	29·749	29·24	29·50	29·80	29·45	29·85	58·8	65·3	51·8	64	47	57	59	49	49	48
11.	30·108	30·045	30·040	29·57	......	30·03	30·03	30·18	55·3	66·8	50·0	64	48	57	61½	...	49	48
○ 12.	30·054	30·014	29·969	29·61	......	30·05	30·26	30·30	54·3	61·4	50·5	57	48	52·5	59	...	50	47
13.	29·878	29·843	29·792	29·47	30·03	30·00	30·30	30·32	49·7	58·8	49·5	56	49	52·5	63	44	50	49
14.	29·970	29·974	29·907	29·56	29·98	30·05	30·33	30·33	58·7	60·0	50·5	69	57	63	71	45	54	52
15.	30·036	29·969	29·959	29·53	30·08	30·08	30·33	30·32	63·3	65·4	58·2	71	48	63·5	73	47½	63	56
16.	30·000	29·960	29·926	29·49	30·04	30·02	30·26	30·23	63·7	72·6	53·6	71	46	66	76	51	63	54
17.	30·058	29·979	29·972	29·57	30·00	29·96	30·20	30·16	55·3	69·8	50·4	75	50	56	76	43½	52	53
18.	29·986	29·929	29·823	29·52	29·92	29·89	30·12	30·12	54·8	71·2	52·0	65	50	57	73	45	53	49
☾ 19.	29·878	29·954	29·824	29·48	29·93	30·00	30·12	30·18	53·5	70·0	51·0	63	59	54	73	46	50½	50
20.	30·122	30·160	29·956	29·62	30·08	30·04	30·18	30·01	51·7	63·2	51·0	63	39	52·5	67½	47	56	51
21.	30·178	30·128	29·984	29·45	29·91	29·90	29·82	29·92	59·3	62·0	50·0	73	51	62·5	65	50½	53½	50
22.	30·044	30·045	29·984	29·47	29·95	29·98	30·00	30·08	60·8	72·6	56·6	70	40	65	48	45	51	50
23.	30·126	30·051	30·027	29·56	30·00	29·99	30·08	30·12	61·3	72·8	51·3	72	49	64	72	47	53½	51
24.	30·070	30·011	29·987	29·55	29·98	29·99	30·13	30·17	59·3	70·3	54·0	66	48	60	74½	49	51	51
25.	29·986	29·962	29·906	29·49	29·99	29·94	30·17	30·16	52·5	65·4	51·0	65	41	55	63	47	55	52
26.	29·940	29·888	29·845	29·42	29·89	29·83	30·08	30·04	56·4	64·0	49·3	73	43	58·5	67	41	51½	50
● 27.	29·830	29·776	29·676	29·31	29·77	29·75	30·00	29·93	61·3	79·7	53·7	76	49	58	65	44	50	49
28.	29·674	29·693	29·629	29·20	29·68	29·70	29·85	29·83	54·3	73·6	51·5	63	40	53	61	42	50	49
29.	29·810	29·797	29·754	29·33	29·70	29·69	29·73	29·71	56·6	63·3	47·3	65	48	53	64	42	51	51
30.	29·922	29·910	29·873	29·36	29·68	29·70	29·70	29·75	60·3	64·3	55·2	67	49	57	61	50	52	49
Mean.	29·875	29·860	29·761	29·33	29·738	29·760	29·923	29·944	57·8	67·6	51·9	66·57	47·13	58·1	63·6	45·2	51·28	48·81

Days of Month. 1843. June.	Wind. London: R.S. 9 a.m.	Wind. Chiswick. 1 p.m.	Wind. Boston.	Wind. Dumfries-shire.	Wind. Orkney, Sandwick.	Rain. London: R.S. 9 a.m.	Rain. Chiswick.	Rain. Boston.	Rain. Dumfries-shire.	Rain. Orkney, Sandwick.	Dew-point. Lond. R.S. 9 a.m.
1.	s.	sw.	calm	e.	ese.	·086	·03	·05	......	......	56
2.	e.	sw.	se.	sse.	nne.	·041	·08	......	......	·04	58
3.	s.	sw.	sw.	ne.	n.	·061	......	·19	......	·57	55
4.	e.	s.	calm	ne.	n.	......	·02	·06	......	......	56
☽ 5.	s.	s.	calm	e.	ne.	·033	·09	1·10	......	......	52
6.	se.	w.	calm	n.	ne.	·130	·17	......	2·05	......	48
7.	s.	sw.	nw.	s.	n.	·247	·23	......	......	......	52
8.	s var.	sw.	w.	s & se.	se.	·130	·10	·22	......	·13	54
9.	s.	sw.	w.	w.	e.	·033	·01	·07	......	......	54
10.	w.	nw.	w.	nw.	n.	·055	·34	......	......	·07	53
11.	w.	w.	w.	n.	nw.	·047	......	......	......	......	50
○ 12.	n.	ne.	ne.	nw.	e.	......	·20	·04	......	·03	52
13.	nnw.	ne.	ne.	nw.	e.	·211	·14	......	......	......	51
14.	n.	se.	se.	ne.	se.	·119	·18	·05	0·40	......	54
15.	ne.	e.	se.	e.	e.	·016	......	......	......	......	59
16.	n.	ne.	e.	ne.	ne.	......	......	......	......	......	58
17.	n.	ne.	e.	ne.	n.	......	......	......	......	......	54
18.	ne.	e.	calm	ne.	n.	......	·01	......	......	......	56
☾ 19.	n.	ne.	e.	ne.	n.	......	·01	......	......	......	55
20.	n.	ne.	ne.	s.	w.	......	......	......	......	......	48
21.	w.	sw.	w.	w.	w.	......	......	......	......	·04	58
22.	n.	ne.	calm	sw.	nw.	......	......	......	0·00	......	55
23.	n.	e.	calm	s.	w.	......	......	......	......	......	55
24.	n.	ne.	calm	e.	n.	......	......	......	......	·04	55
25.	nnw.	n.	e.	e.	ne.	......	......	......	......	......	52
26.	n.	e.	calm	ene.	nne.	......	......	......	......	......	52
● 27.	e.	ne.	calm	ne.	n.	......	......	......	......	......	53
28.	n.	n.	nw.	ne.	n.	......	·01	......	......	......	45
29.	nw.	nw.	w.	nw.	nw.	·016	......	......	0·00	......	42
30.	w.	w.	w.	w.	n.	......	......	......	......	·12	54
Mean.						Sum. 1·225	1·62	1·78	2·45	1·04	Mean. 53

THE ANNALS

AND

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XIX.—*Upon the Anatomy of* Phalangium Opilio (*Latr.*). By Alfred Tulk, Esq., M.R.C.S., M.E.S.

[With a Plate.]

With the exception of the treatise by Treviranus upon the anatomy of *Phalangium, Die Afterspinne,* in his 'Vermischte Schriften,' I am not aware that any author has since given a detailed account of the structural peculiarities of this very singular family of Arachnidans. The observations of Latreille*, Ramdohr†, Hermann‡, Marcel de Serres§, Herbst|| and others, are limited to particular organs, most of which are described and figured in too superficial a manner; while those made by Treviranus, though excellent as a whole, are yet wanting in sufficient minuteness, and several interesting parts have been either entirely overlooked, or but cursorily alluded to. I have endeavoured, therefore, in the present paper to supply, as far as the delicacy of the objects dissected would permit, the above deficiencies, and, in communicating the results of investigations commenced during the summer of 1842, to enter into a more full and accurate description of the anatomy of the Harvest Spider than has hitherto appeared. The species which I have selected for this purpose is *Phalangium Opilio,* as it is the most abundant about London, and has been regarded also as typical of the genus to which it belongs.

External Anatomy.—The *dermo-skeleton* of *Phalangium* is constituted, as in the other Arachnida, by the external integument, which is continuous over the whole body, but variously disposed and inflected, to form prolongations for the lodgement of the different viscera and attachment of muscles. Its texture is tough and coriaceous, as in the true spiders, and of a firmer consistence at the anterior than the posterior extremity of the animal, namely, upon the upper and under surface of the cephalo-

* Hist. Nat. des Fourmis: Paris, 1802.
† Ueber die Verdauungswerkzeuge der Insekten, 1811.
‡ Mém. Apterologique, 1804. § Mém. du Mus.
|| Natur. System der Ungeflügelten Insekten: Berlin, 1797.

thorax, upon the sternal plate, and the first dorsal and ventral segments of the abdomen.

It consists of three layers, which, being but loosely adherent, may be readily separated from each other. The outer, or epidermis, is colourless and transparent, and made up of numerous minute, irregularly conical and projecting cells, closely set upon a subjacent connecting membrane, but not in contact with each other. Besides these, there are other larger, more opake and prominent cells, scattered less freely over the rest of the integument, and prolonged here and there to form short spines. Lastly, a set of large, more or less obtusely conical, flattened or papilliform eminences are distributed, few in number, and with regularity wherever they occur, and are remarkable for having a single bristle, springing from a tubercle, seated upon one side of their base. They are arranged in a single row upon the middle of each dorsal segment, around the corneæ of the middle pair of eyes, and on the sides and anterior margin of the cephalo-thorax, presenting the most acuminated form however in the first of these situations. Upon the internal surface of the integument several rounded depressions are seen to lead into the interior of these large tubercles, showing that they are formed by simple eversions of the epidermis, which has become hard and horny in such situations. The smallest sized cells are continued for a short extent into these cavities, which contain, generally, a blackish nodule of colouring matter. The points of attachment of the muscular fasciculi are apparent as numerous rounded or oval patches of a pale brown colour, and of different sizes, placed upon slight internal elevations, which correspond with certain dark impressed puncta upon the outer surface, and of a fibrous texture, resulting from the still adherent but divided ends of the fasciculi. Internal to the above layer is the second or pigmentary. It consists of a white, delicate and homogeneous membrane which supports a granular matter, disposed in patches between it and the epidermis, and which corresponds in position with the dark spots and markings seen upon the exterior of the animal, and is prolonged also into the interior of the hollow tubercles. Beneath the above is a structure which may be regarded as analogous to the corium of insects, yet which differs from it in not being composed of numerous fibres interlacing with each other, but forming a single, regularly disposed stratum or layer, similar to that found in the Pulmonary Arachnida. It consists of several fasciculi, of large size, and separated from each other by a considerable interval, which are arranged longitudinally upon the under surface of the animal, where they are also most numerous, but take a more or less oblique direction upon the sides. They are composed of six or more elongated and flattened fibres, lying close and parallel

with each other, so as to constitute a band which passes (at least upon the inferior surface of the abdomen,) from the inflected margin of one segment to the distal border of the next, each fibre having a distinct and separate attachment by its two extremities to the elevations, above noticed, upon the internal surface of the epidermis, while the intermediate portion lies free over the space of two segments, and may be readily raised therefrom upon the point of a fine needle. Examined with a power of 200 linear, each of these fasciculi is seen to be made up of an aggregation of smaller fibrillæ, which are apparent from the ends of the former when detached, giving to them a tufted or brush-shaped figure. There are no traces of transverse striæ upon these fibres, and they do not dissolve or lose their form by maceration, like ordinary muscular tissue. In certain situations, as upon the sides of the abdomen and thorax, the form of their bands is triangular, the apices being directed upwards, and I have observed them to present there a very glistening nacreous lustre.

A comparison of the above structure of the integument in *Phalangium* with that of a large species of *Epeira* (*E. maculata*, Fab.) presents many obvious points of resemblance; the chief difference being, that in the latter the fibres of the corium are more closely arranged, are smaller in proportion to the size of the animal, and all take a transverse direction within the abdomen, and are moreover enveloped both above and below by a considerable layer of fat, which, with the exception of a few scattered adipose granules in the same situation, can be scarcely said to exist in the harvest spider. Notwithstanding the entire absence of transverse striæ, I am disposed to regard the fibres of the corium as constituting a thin muscular expansion, which in the Arachnida generally may take the place, and supply the function of, the regular longitudinal muscles of the thorax and abdomen in insects, which would otherwise be wanting in the family and class under consideration.

The body of *Phalangium* (Pl. III. fig. 1.) appears at first to be composed only of a single piece, so intimately are the cephalothorax and abdomen blended together; but when examined more closely, a distinction into these two principal divisions is readily observed, though they are not so clearly indicated as in some of the Tracheary Arachnida, such as *Galeodes*, where an intervening constriction denotes their respective limits. I shall consider, therefore, each of these portions of the dermo-skeleton separately, commencing with the cephalo-thorax and the structures appended thereto.

The *cephalo-thorax* in *P. Opilio* (Pl. III. fig. 1. *ct*) occupies about one-fifth of the entire length of the body. The upper plate or *buckler*, darker in colour than the rest, is, as regards its con-

tour, elliptical, more or less convex upon its upper surface, having the lateral margins sinuated and prolonged backwards, the anterior deeply excavated by a crescentic notch, which is interrupted in the middle by a slight rounded projection, while behind, a transverse curved and elevated ridge (*r*) supporting a single row of spines marks out its limits from the abdomen. Situated nearly in the centre of the thoracic shield is a large and prominent tubercle (*t*), somewhat quadrilateral in form, with the angles rounded off, its transverse diameter being greater than its longitudinal, and encroached upon on either side, in an oblique direction upwards and inwards, by the round and glistening corneæ of the middle pair of eyes. Along the superior and posterior margins of these corneæ, but at a little distance from the latter, is a row of obtuse tubercular eminences, and between these a slight groove, dividing the upper surface of the binocular support along the median line. Upon either side, and in front of the latter, the thoracic plate presents a wedge-shaped elevation (*e*) which extends from the posterior ridge, narrowing towards the anterior margin of the thorax, beyond which it projects. Its anterior angles are furnished with a cluster of tubercles, and towards the plane of position of the ocular support it inclines downwards, so as to leave a slight circumjacent groove. Upon either side of the thorax, at a point opposite to the interval betwixt the coxæ of the two anterior pairs of legs, is an oblong, laterally compressed ridge, bounded internally by an impressed and wavy line, externally by one of the sinuosities of the lateral margins, and which supports a single ovoid cornea (*c*), having one or more tubercles near to either extremity. From the centre of the anterior margin of the thoracic plate there is prolonged, in a vertical direction downwards, a horny partition (Pl. III. fig. 3. *s*), which separates the cavities for the insertion of the cheliceræ upon either side, and which is attached below to what appears, when viewed *in situ*, as a cordate horizontal body (*ex*) supporting in front a lanceolate deflexed structure, both of which assist in closing the cavity of the mouth anteriorly, and will be considered, therefore, more in detail in speaking of the manducatory organs.

The first articulated pieces, commencing from before backwards, which will require our attention, are the two *cheliceræ* or antennal claws (Pl. III. fig. 3. *ch*). These organs consist each of two coriaceous joints. The basal, shorter than the one succeeding and laterally compressed, has its upper surface convex anteriorly, the lower concave, and prolonged further backwards to form with the posterior margin an acute angle, and is received into the cavity, situated with its fellow, upon either side of the vertical septum, above mentioned. These cavities lie immediately beneath the anterior border of the thoracic plate, by inflections of which they

are formed, and by which they are bounded from above, laterally, by two pieces which support the maxillary palpi, and below, by the appendages to their internal septum. There are a few scattered spines and bristles upon the upper surface of this joint. Its movements are limited to simple ginglymus in a vertical direction, or upwards and downwards, and when at rest, the basal joints lie perfectly parallel with each other, and upon a plane nearly level with the dorsal surface of the cephalo-thoracic shield. The second or terminal joint of the chelicera is articulated to the above at an acute angle. It is broadest behind, where it presents a slight conical projection, and gradually tapers toward its termination, becoming flattened from before backwards, and is there prolonged internally to form a curved horny pincer, dentated and immoveable, and which is opposed to another (*d*) similarly constructed but longer, having a single triangular tooth larger than the rest on the middle of its inner edge, and which moves freely in a horizontal direction against the first. Along the upper surface of this joint and upon the sides, especially the inner, are rows of short black bristles. When at rest, these joints are bent at a right angle with the basal, and parallel with each other, are supported by the first pair of maxillæ. These organs, which, unlike their analogues in the true spiders, are unprovided with any poison-sac, serve merely for grasping the food, and retaining it in contact with the organs of manducation placed upon the under surface of the thorax. Before proceeding, however, to the examination of these latter, it will be best to explain the construction of certain parts, to which allusion has been already made.

The anterior margin of the cephalo-thorax (Pl. III. fig. 3. *m*) is deflected obliquely downwards for its entire extent, to form a thinner piece, paler in colour than the rest, and grooved along the median line, its free border being crescentic, but prolonged in the middle to form the triangular origin of the vertical septum (*s*). This septum is laterally compressed, cartilaginous, and membranous to a slight extent upon the margins (Pl. III. fig. 4. *s*), but it is not prolonged backwards into the thoracic cavity, so that the muscles, tracheal trunks, &c. passing from the latter into the chelicerae, are in contact with each other internally. The cavities for the reception of the latter organs are incomplete also externally, their outer wall being constituted simply by the basal portion of the maxillary palpus (*bp*). The horizontal piece, with the posterior margin of which the septum is confluent in a bifurcated manner below, is of a somewhat elongate and quadrate form. Its upper surface is elevated obliquely forwards from the posterior margin, to form a convex, smooth, transversely oval and regular projection (Pl. III. fig. 4. *a*), slightly overlapping the base of the labrum (*l*).

The posterior and inferior margins of this, the *epipharynx* (so called, as will be seen hereafter, in treating of the digestive organs, from its lying *upon* the pharynx, or rather inclosing that portion of the alimentary canal), are prolonged backwards, to form two elongated projections (*f*) directed slightly outwards, nearly of equal width throughout, having the superior margin concave, the inferior somewhat convex, and terminating by an abrupt truncated extremity. Below, the epipharynx is hollowed out (Pl. III. fig. 5. *u*) by being bent laterally upon itself, in the direction downwards, the margins of the inflections being prolonged inwards in an angular form, and serving to define or separate the borders of the cavity into two distinct portions; an anterior, obovate, with the large end directed forwards, and the plane of the opening being obliquely upwards, while the posterior, expanded behind and narrower in front, is circumscribed by the divergent angles above mentioned (*f*). At the point of attachment of the septum the upper surface is depressed, and occasionally furnished with a cluster of small spines (*), and upon either side it is bounded from the lateral prolongations by a transverse, thick and cartilaginous ridge (*g*), continuous with their superior and inferior margins. Situated upon the upper surface, on either side of the base of the posterior angles, are two short, conical and cartilaginous projections (*h*), directed obliquely outwards upon the sides of the basal joint of the cheliceræ.

The labrum or *epistome* (*l*), which overlies the oral aperture, is a cartilaginous, papilliform and hollow structure, prolonged by its base from the anterior extremity of the epipharynx. It has a few bristles upon its upper convex surface, and the inferior surface is concave.

The internal surface of the cephalo-thorax presents several grooves or ridges corresponding with the external elevations or depressions. A transverse posterior groove, defining its limits from the abdominal cavity; a middle triangular fossa, having in its centre a nearly circular opening, leading into the deep cavity of the ocular tubercle; on either side, anteriorly, the elliptical opening of the lateral eyes; and internal to these, two wide and oblique grooves, bounded externally by a narrow ridge.

Upon either side of the basal joints of the cheliceræ, externally, two cartilaginous pieces (Pl. III. figs. 3 and 5. *bp*) descend vertically from the antero-lateral angles of the thoracic shield. They are of an elongated and irregularly triangular shape, their bases being directed downwards, and presenting upon their anterior surface an elevated articular cavity (Pl. III. fig. 5. *h*) for the reception of the first free joint of the palpus (2), whilst, beyond this point, an expanded prolongation passing inwards towards the median line constitutes the first pair of jaws (*i*). This cavity

(Pl. III. fig. 9. *y*) is formed by a division of the joint into two portions: the internal (Pl. III. fig. 9. *v*), more or less convex, has its margins raised in front into ridges, which circumscribe a quadrilateral surface, and abuts against the anterior part of the epipharynx, and terminates by bending upon itself in an outward direction, to form, behind the second joint of the palpus, a transverse oval projection of a white colour, and beset with bristles (Pl. III. figs. 9 and 10. *tt*); while the external is continued as an elongate and flattened piece (Pl. III. fig. 10. *o*), concave within, and with thickened edges, to be connected with a corneous arciform fold of the maxillæ (*n*), presently to be described. That the above pieces are in reality but a pair of coxal joints, modified like those of the foot-jaws of the Crustaceans, or their corresponding parts in the other Arachnida, to subserve a double function, is evident both from their position and general form; and in species where the palpi are largely developed, as *P. Cornutum,* this analogy becomes still more striking. I shall therefore consider these as the true basal joints of the palpi, each of which will thus consist of *six* principal divisions, comparable to those of the legs, instead of *five,* as described by authors. The second joint of the palpus (Pl. III. fig. 3. 2), representing then the exinguinal or trochanteric of the extremities, shorter than the one succeeding, is articulated in a ginglymoid manner to the basal. It is broadest superiorly, its upper surface slightly concave, its lower convex, and it is dotted over with short stiff bristles. The third, fourth and fifth joints (3, 4, 5) are constructed upon the same plan with the second, the third nearly equalling in length the two others, and curved slightly upwards, with the surface spined and bristly. The fourth and fifth, analogous to the divided tibia, as the former was to the femoral, are more curved than the rest, and dilated anteriorly. The sixth (6), terminal or tarsal joint, is the longest and narrowest of all, cylindrical, and widening gradually towards the apex, where it terminates in an obtuse, rounded extremity, supporting a single small hook or unguis, its whole surface being plentifully furnished, like that of the two preceding, with bristles of unequal length. When the palpi are at rest, they are bent upwards at an acute angle with the basal joint, and downwards again, at the junction of the third and fourth articulations, the first of which rests against the outer side of the chelicera, projecting above the anterior margin of the thoracic shield.

Hahn (in his 'Die Arachniden') has figured the sexual differences in the palpi of a male and female *P. Opilio.* The fourth joint of the male is represented as having a hairy prolongation springing from it, nearly equalling in size the joint itself, while that of the female is destitute of any such appendage, and the

joints are more slender and uniform throughout. I have examined with care the palpi of several male and female *Phalangia*, and can discern no such structure as that indicated by Hahn in the male. The only apparent differences in these organs are, a greater thickness of the joints in the male (Pl. III. fig. 6. ♂) than in the female (Pl. III. fig. 7. ♀), with the bristles upon them stronger and better defined, and the anterior dilatation of the terminal joint more abrupt and rounded in the former than the latter. With regard to the cheliceræ, the joints are also larger and more robust, and the posterior angle of the second one is more prominent in the male than in the female (Pl. III. figs. 6, 7.).

Posteriorly, and internal to the second joint of the palpi, are situated the *first* pair of *maxillæ*, a continuation, as has been seen above, of their basal articulation (Pl. III. fig. 3. A). When viewed *in situ* from the under surface of the body (Pl. III. fig. 8. A), they have the appearance of two membranous, dilated and cordiform bodies, lying in contact with each other along the median line, their broad ends placed beneath the extremity of the labrum (*l*), while their apices, directed towards the interval between the second pair of jaws, are marked by several curved and longitudinal folds. The turgid condition of these organs, and of the succeeding pair, alluded to by Latreille* as occurring in them when employed, seems in the present case to be caused by the spirit, in which the specimens have been kept, penetrating and distending their interior; and this will be readily understood, when it is premised that their essential construction is that of a coriaceous membrane, plicated and folded upon itself from below upwards to form a hollow pouch. The form of these maxillæ is oblong, terminating in an irregular, slightly expanded, or clavate extremity. They present for examination three distinct surfaces: a superior, lying nearly upon a level with the upper part of the epipharynx and labrum; an inferior, directed obliquely upwards and backwards; and an internal, approximated with its fellow along the median line. Upon the first of these, posteriorly, and to its outer side, is a conical curved projection (Pl. III. fig. 9. *k*) with an acute and membranous point; and leading inwards from the base of this, towards the apex of the labrum, with the sides of which the jaws are united, is a thickened ridge (*l*). Beyond the latter is the turgid dilatation of the maxilla, of a dark colour towards the tip, from its becoming there densely clothed with hair, and transversely plicated (*m*). Turning next to the inferior surface (Pl. III. fig. 8. A), the shape of which, as resulting from its being partly concealed by the second pair of jaws, has been already described, by drawing it slightly forwards, a dark, horny

* *Op. cit.*

and semicylindrical bow (Pl. III. fig. 10. *n*) is perceived. It commences by a pointed extremity, which is continued from one of the external folds, and runs almost parallel with the anterior margin of the second pair of jaws, bending as it approaches the median line, and passing upwards towards the under surface of the epipharynx, this vertical part of its course being about twice the length of the preceding, or transverse. When at some depth above the under surface of the body, this bow bends again suddenly upon itself in the direction upwards, the convexity formed by the loop being placed most external, and narrowing and becoming flattened as it proceeds obliquely upwards and inwards, terminates by blending with the free border of the folded membrane of the jaws. Within the concavity formed by this bow may be seen the rounded extremity of the elongate piece (Pl. III. figs. 9 and 10. *o*) mentioned in speaking of the maxillary palpi, and with which the bow is connected by a thin membrane externally, while on the opposite side it is continuous with that of the jaws. After it has reached, however, the lower border of this piece, it curves round it, and is then simply supported by the free and delicate margin of the maxillæ (Pl. III. fig. 9. *p*). This latter, thickened and cartilaginous for about half its extent, forms an angle superiorly (*q*) with that portion of the maxilla which is continuous with the margins of the labrum, and projecting in the middle triangularly, becomes very thin and membranous, and where the terminal part of the bow rests upon it, is prolonged upwards in an obtusely angular manner. The bow itself is formed by a simple eflection of the maxillary membrane, and its cylinder is incomplete inferiorly, where the margins coalesce with the latter. The dark colour of the anterior plicated portion of the maxillæ is due to the presence of numerous brown, closely appressed hairs, which are longest upon the middle of the folds, and have an oblique direction upwards. They are seated upon short and parallel ridges, and give a peculiarly soft and velvety appearance to the jaws.

As the first pair of jaws were found to be formed by internal prolongations of the basal joints of the palpi, which were in themselves, essentially, modified organs of locomotion, so the *second*, or succeeding pair of maxillæ, placed immediately behind them (Pl. III. figs. 3 and 8. B), occupy a similar position in relation to the first pair of coxæ (1, 1), and, though simpler in construction, yet consist, like the preceding, of two membrano-coriaceous pouches, which, when distended by fluid, present a very regular and oval form. Attached to the anterior side of the inner extremity of the coxæ of the first pair of legs is a short and longitudinal ridge of integument (Pl. III. fig. 12. *a*) with a few bristles upon it, terminating in front by a free, slightly curved and ob-

tusely triangular point. Internal to this piece is a second (*b*), hollowed out within, and of a prominent and nearly hemispherical form, upon the surface of which are scattered tuberculated bristles, directed for the most part outwards. To the inner edge of the above, which is oblique and somewhat sinuated, the membranous fold of the second pair of maxillæ (*c*) is connected. It is densely clothed with hair, excepting towards its free margin, which is curved upon itself as it approaches the median line, and becomes continuous with the inflected borders of the labium (Pl. III. fig. 11. *d*). Externally it is strengthened and supported by an elongated cartilaginous piece (*e*), formed by a deflection of the first-named ridge. The margins of the jaws are also connected to each other, so that all horizontal action between them is thereby prevented.

Situated behind the above organs, and occupying in length the space intervening between the coxæ of the two middle pairs of legs, is a broad and nearly quadrate *labium* (Pl. III. figs. 8, 11, and 13. C). Its anterior half is thin and membranous, and presents a bilobed deflexed margin, while its posterior moiety is opake and coriaceous, and is attached to a narrow transverse piece (Pl. III. fig. 13. *a*), united laterally with the apices of the third pair of coxal joints. This last is broad at either end and constricted in the middle, and is inflected twice, to form corresponding ridges within. The margin by which it articulates with the labium is crescentic.

There now only remain to be noticed, as completing the *instrumenta cibaria*, two elongate, obtuse and conical pieces (Pl. III. fig. 14. *a*), which are prolonged forwards and inwards from the coxæ of the second pair of legs. Their base presents a free outline, separated by a slight constriction from the surface of the latter joints, and their margins are membranous. They are beset with long black bristles placed upon tubercles. By either side of their base these pieces are in contact with the first and third coxæ, their posterior margin lies in front of the sternal lip, and their apices rest against and upon the sides of the labium (Pl. III. fig. 8. D).

The *abdomen* of *Phalangium* (Pl. III. figs. 1 and 2.) is ovoid in form, convex both above and below, but more so upon the upper aspect, and narrowed slightly towards its posterior extremity. It presents faint markings of segments, which, though less distinct in the present species than in some others, as *P. Cornutum* and *P. quadridentatum*, are sufficiently indicated upon the dorsal surface, where they are least apparent, by transverse rows of dark tuberculated bristles and slightly impressed lines, the first of these corresponding with the middle, the latter with the inflected margins of the arcs. The first and second of the dorsal

segments (*ds*), *ten* in all, are much better defined than the rest, which increase in width towards the middle of the abdomen and diminish again towards its anal end, where they curve downwards, following the convex form of the body; so that the last of the dorsal arcs (Pl. III. fig. 2. *o*) presents itself as a very small oval plate, wedged in betwixt the one which precedes it (*ds*) and the last of the ventral segments, upon a level nearly with the surface of which it lies. The transverse depressions which separate the ventral segments from each other are deeper than those upon the upper surface of the abdomen, and are rendered still more distinct by the presence of rows of dark elongated puncta (*pa*). The limit of the sternal portion of the thorax (Pl. III. fig. 2. *st*), which appears merely as a prolongation of the anterior arcs, is effected by the first of the above transverse grooves (*p*), terminated at either end by a large and impressed punctum. Behind this the ventral arcs, *five* (5) in number, decrease in size from before backwards, and may be very clearly demonstrated by allowing the body of a harvest spider to dry, when the integument contracts into corresponding folds. Internally there are slight ridges. The *sternum* (*st*), obtusely triangular in form, extends as far forwards as the coxæ of the third pair of legs, where it forms a thickened, emarginate lip, which covers the aperture leading to the sexual organs. Upon either side, and at a little distance from the base of the sternal plate, is a deep groove (*), situated between the posterior coxæ and the under surface of the abdomen, within which are the respiratory openings, and which is bounded internally by a longitudinal ridge.

The *organs* of *locomotion*, eight in number, constitute, from their extreme length, one of the most striking and characteristic features in the outward form of the *Phalangia*. They radiate from the under surface of the thorax, as in the *Scorpionidæ* and other Arachnida, and are there attached by short, conical and obtuse coxal joints (Pl. III. fig. 2. *c*), the apices of which converge inwards towards each other, while their opposite ends, truncated, form an articular cavity, and project upwards, upon either side of the cephalo-thoracic plate. These joints are formed by simple eflections of the integument, and are attached throughout nearly their entire length to the thorax, so as to be immoveable, and thus afford a fixed point of attachment for the muscles. Upon the internal side of the under surface of the thorax four projecting septa are perceived, formed, with the exception of the most anterior and posterior, by the contiguous sides of a pair of coxal joints, the margins of which are connected together by a thinner and more membranous portion of integument, which is readily thrown into folds and again extended. The posterior septum is incomplete, being only formed internally by the side of the sternum, and the inner extremity of the last coxal joint. The concavities

of the joints are thus distinctly circumscribed, with the exception of the last. The apices of the two posterior pairs of coxæ abut against the sides of the sternum; the third, shorter than the rest, has the elongated appendage already described in front, and the most anterior pair support the second pair of jaws. The articular cavity presents, inferiorly, an oblique crescentic margin, to which the ligament attaching the second joint is fixed. The upper half of the margin is straight, and has in the centre an acute spine directed outwards. The second joint or trochanter, which articulates with the preceding by ginglymus, is of small size and somewhat quadrate in form. It is more convex below than above, and shorter in the reverse direction, owing to the oblique position of the articular openings. The sides of the distal extremity are prolonged into a short spine, and the margin of the proximal cavity presents in the centre, inferiorly, a blunt, flattened and conical projection. A dark impressed line extends from the distal end of the joint to nearly half the length of the upper surface. The third joint or femur, long and slender, has rows of spines, with short bristles intervening between them, disposed longitudinally over it; its inner extremity is slightly dilated, and prolonged obliquely into a conical shape. The external has an oblique articular cavity, for the reception of the fourth joint, or first portion of the divided tibia, which, with the second, is constructed upon the same general plan with the femur, only it is much shorter. To the above joints succeeds a long, filiform and multiarticulate tarsus. The first joint is the longest, and from this they gradually diminish in length towards the extremity of the tarsus, where they become nearly globular. They are fringed upon either side with close-set hairs, directed obliquely downwards, and their anterior angles are furnished with a strong spine. The last joint is oblong in form, and supports a single curved and moveable hook. The following is the number of joints, commencing with those of the anterior tarsi:—1st, 37 joints; 2nd, 76 joints; 3rd, 35 joints; 4th, 38 joints. Total for all the tarsi, 372 joints.

DESCRIPTION OF PLATE III.

Fig. 1. The body of a *Phalangium Opilio*, as seen from its upper surface. Eight only of the dorsal segments are visible.

Fig. 2. The same, from below. In both views the legs have been removed at their articulations with the coxæ, leaving only the latter attached to the cephalo-thorax.

Fig. 3. An antero-inferior view of the cephalo-thorax, exhibiting the cheliceræ drawn apart to show their vertical septum, the epipharynx and labrum, *l*; the first and second pair of maxillæ, with the palpi and first pair of coxal joints. 1.

Fig. 4. A side view of the septum, epipharynx and labrum, detached.

Fig. 5. External view of the right chelicera, to show the basal joint of the maxillary palpus, prolonged inwards at *i*, to form the first pair of jaws.

Fig. 6. Male chelicera and palpus. *Fig.* 7. Female ditto.
Fig. 8. Inferior view of the maxillary organs, as they appear when distended with spirit; 1, 2, 3, the three anterior coxæ.
Fig. 9. Internal view of left maxilla of the first pair; *z* is the part by which it is attached to the side of the epistome.
Fig. 10. External and superior surface of ditto.
Fig. 11. Internal view of the second pair of maxillæ, to illustrate their connection with the labium.
Fig. 12. External view of left maxilla of second pair.
Fig. 13. The labium detached, and viewed from the external surface.
Fig. 14. One of the appendages to the coxæ of the second pair of legs (left side).

The above are all magnified figures of the objects, as seen under simple lenses, ranging from $1\frac{1}{4}$, $\frac{1}{4}$, to $\frac{1}{8}$ inch, focal length.

[To be continued.]

XX.—*List of Birds obtained in the vicinity of Calcutta, from September* 1841 *to March* 1843 *inclusive.* By Edward Blyth, Curator to the Museum of the Asiatic Society of Bengal.

[Continued from p. 101.]

127. *Hirundo rustica.* I have never seen a living swallow since my arrival; but the museum contains an example of this species procured in the neighbourhood.

128. *Motacilla leucopsis,* Gould; *M. alboides,* Hodgson; figured by Sonnerat. Very common during the cool season. This species is even intermediate to the nearly allied *M. alba* and *M. Yarrellii* of Europe: like the latter, it has a black back in summer, and is distinguished from both by the quantity of white on its wings.

129. *M. boarula.* Common in the winter months.

130. *M. variegata,* Vieillot, not of Latham. A remarkable species, of which might be made a separate subdivision. It is nearly related to *Budytes,* but the hind-claw is not lengthened. I procured a single mutilated live specimen from a bazar shikaree, and am told that it may now and then be met with in the mango orchards.

131. *Anthus arboreus* (?). Common in the cool season. Though most closely allied, I am not altogether satisfied of its identity with the species of Europe.

132. *A. Richardi.* Common about rice-fields. This bird is captured in great numbers for the table, and sold with others under the general name of 'Ortolan.' They are brought alive to the bazar, having the feathers of one wing torn out, and very often those of the tail, from the careless manner in which this is done. Hence the mutilated condition of the specimens of Nos. 91, 92, 93 and 130, which I have alone hitherto obtained.

133. *A. agilis.* Common in dry situations during the cool season, much rarer at other times.

134. *Alauda Gangetica,* nobis; *A. gulgula,* Franklin, *apud nos,* Journ. As. Soc. Beng. xi. 201. Common, and frequently sold for the table: breeds in the neighbourhood.

135. *A. gracilis*, nobis, J. A. S. B. *id.* In compliment to those who differ from me in opinion respecting this bird, I shall not here enumerate it as a distinct species, and I much wish to establish its distinctness on the authority of other specimens.

136. *Corypha* (? G. R. Gray) *baghaira*; *Emberiza baghaira*, Franklin; *Alauda Dukhunensis*, Sykes. Brought in immense numbers for the table during March; being the 'Ortolan,' more especially so styled, of Anglo-Indian epicures.

137. *Mirafra Assamensis*, M'Clelland and Horsfield. Often brought to the bazar among the so-called 'Ortolans.' Breeds in the neighbourhood.

138. *M.* (?) *cantans*, Jerdon. The true *Aggan* of India generally. I have obtained one wild-shot specimen, and seen others in cages, they being very highly esteemed for their song.

139. *Pyrrhulauda crucigera.* Common at all seasons, in the localities they frequent.

140. *Euplectes Phillipensis.* Common.

141. *Eu. Bengalensis.* Occasionally procurable in considerable numbers in the shops, being taken in the neighbourhood.

142. *Eu. striatus*, nobis, J. A. S. B. xi. 873. The same remark applies to this species, and I am told that it breeds abundantly in some high reeds a few miles from Calcutta.

143. *Amadina punctata*; *Fringilla punicea*, Horsfield. The immense numbers of amaduvats brought to the shops are, I believe, obtained from some distance.

144. *Spermestes nisorea*; *Munia acuticauda*, Hodgson. Tolerably common.

145. *Sp. melanocephala*; *Munia rubroniger*, Hodgson. Tolerably common.

The Java sparrows (*Sp. oryzivora*) sold in the Calcutta shops are all imported.

146. *Passer domesticus.* As common as in England. I have also specimens from Southern and from Western India, but not any agreeing with the *P. Indicus*, Jardine and Selby. *I think*, however, that they differ from the British sparrow in having much whiter under-parts.

147. *Emberiza fucata* (?); *E. cia*, apud Jerdon: vide J. A. S. B. xi. 601.

148. *Erythrospiza* (?) *rosea*; *Fringilla rosea*, Vieillot: vide J. A. S. B. xi. 461. Often sold in the shops, and occasionally (as I am informed) shot in the neighbourhood.

149. *Chloropsis aurifrons*; erroneously figured as *Chl. Malabaricus* by Messrs. Jardine and Selby*. Now and then brought in some plenty to the shops, but I have not ascertained it to inhabit this neighbourhood. It is a pleasing songster.

150. *Cinnyris sola*†. Very common.

151. *C. Mahrattensis.* Not rare during the cool season.

* Corrected in description of Pl. C.—Ed.

† *C. sola*, Jerdon, and nost. of the Cat. of Indian Birds, is *C. Zeylonica*, Linn.

152. *Dicæum erythronotum.* Rare.

153. *D. Tickelliæ,* nobis ; *Nectarinia minima,* Tickell. Very common.

154. *Vinago militaris.* Common.

155. *V. bicincta,* Jerdon. Not rare.

156. *Columba tigrina.* Extremely common.

157. *C. risoria* (?). Tolerably common.

158. *C. meena,* Sykes.

159. *C. humilis.* These two species may often be purchased in the shops, but do not appear to be common in this vicinity.

160. *C. Javanica.* Tolerably common.

161. *C. livia* (?), var. ? *C. œnas,* Sykes and Jerdon. A wild pigeon, which seems to have originated most of the dove-cot pigeons of this part. In the London markets vast numbers of a wild pigeon (all shot birds, and not differing in form or plumage,) may be observed, which essentially resemble *C. livia* (*vera*), except that the wings are not barred, but spotted as in *C. œnas* ; the Indian bird, on the contrary, has the barred wing, but no white on the rump : among the domestic varieties, however, of the latter may be seen many with spotted wings. It is probable that all three are esculent species, aboriginally distinct, but which readily merge together when domesticated.

162. *Francolinus vulgaris.*

163. *Fr. gularis.*

164. *Fr. Pondicerianus.* These three species are occasionally brought by the bazar shikarees, the second very rarely, and the third most commonly. It is indeed doubtful whether *Fr. gularis* is found in this vicinity, though numerous two or three hundred miles up the river.

165. *Coturnix dactylosans.* The most plentiful species of quail in this part.

166. *C. textilis.* Rare.

167. *C. Phillipensis.* Rare.

168. *C. flavipes,* nobis, J. A. S. B. xi. 808. I have obtained a pair only of this diminutive species, separately, as mentioned in the original description cited.

169. *Turnix taigoor.* Apparently not rare.

170. *T. Dussumieri.* Apparently not rare.

171. *Pavo cristatus.* Wild specimens are occasionally offered for sale alive, but are brought from some distance. They precisely accord with the ordinary (not the japanned) variety of the domestic peafowl in plumage.

172. *Grus cinerea.* Occasionally snared by the shikarees.

173. *Ardea cinerea.* Common.

174. *A. purpurea.* Common.

175. *A. flavirostris.* Not rare. The young bird has a black bill, in which state it is enumerated by Col. Sykes as *A. egretta.*

176. *A. putea.* Named in MS. by Buchanan Hamilton. A middle-sized crestless white egret, with yellow bill and black legs ; the former also yellow in the young. Not rare.

177. *Ardea garzetta.* Common.

178. *A. caboga,* v. *russata.* Common. This species rarely fishes, but feeds principally on grasshoppers, habitually following cattle for those they cause to rise, as long ago noticed by Sonnini. Hence it is styled *Ghai-bogla* (Cow Heron) by the Bengalees, which Pennant has corrupted into *caboga.*

179. *A. Javanica.* Common. Generally met with singly, in retired tanks surrounded by jungle. I have just received a specimen from the Mauritius.

180. *A. nigra,* Vieillot. I have reason to believe this beautiful species also occurs here, though I have not yet met with it.

181. *A. Malaccensis.* The ordinary *Paddy bird,* though the white species are often likewise styled so. Remarkable for the diversity of its summer and winter plumage. Extremely common, and very familiar.

182. *Botaurus stellaris.* I have obtained one recent specimen.

183. *B. cinnamomeus.* Not uncommon.

184. *Nycticorax Gardeni.* Not uncommon.

185. *Ciconia alba.* Occasionally met with.

186. *C. leucocephala* ; *C. umbellata,* Wagler. Not rare.

187. *Argala migratoria,* Hodgson ; *Ciconia argala,* Auct. The gigantic adjutant, or *Hurgalah* of the natives. This immense species visits Calcutta in great numbers during the rainy season, and leaves chiefly in November ; a few stragglers only remaining throughout the year. I need hardly remark that it walks tamely about the streets, picking up garbage, surrounded by the kites and crows, and also dogs, which all may be seen together about a heap of rubbish, —three or four of these adjutants, with perhaps one or more of the next species to complete the group : or they rest, statue-like, on the house-tops, one often at each corner of a square building, like so many artificial ornaments. Their various attitudes are highly picturesque, and it is a truly droll sight to observe two of these great gawky birds pulling away at each end of a bit of gut or whatever it may be, with wings expanded, when perchance another gobbles away the prize on a sudden from them both. They vary considerably in shade of colour, the oldest apparently becoming of a lighter gray.

188. *A. capillata* (?) ; *Ciconia capillata* (?), Tem. ; *C. Javanica* (?), Horsfield ; *C. nudifrons,* M'Clelland, not of Jerdon ; *C. immigratoria,* Hodgson ; *C. calva,* Jerdon. I strongly incline to the opinion that all these refer to the same species, though the two first (long since identified) are described to have a reddish-brown spot on each feather of the last range of their middle wing-coverts, which I have found no trace of in the two or three Indian specimens (and one from Maulmain) which I have as yet minutely examined*. The absence of this character induced Dr. M'Clelland to describe his Assamese bird as distinct, and this is decidedly identical with the Nipâlese, Bengalese, Southern Indian and Tenasserim species. Though scarcely observed by anybody, this species is common in the vicinity of Cal-

* Possibly the young are so marked, which I must try to ascertain.

cutta throughout the year, but comes less within the town than the preceding one, albeit it is there far from rare; but about a large abattoir on the outskirts of the town it is most numerous. There are two other Indian species of this group, viz. *Ciconia nudifrons*, Jerdon, an inhabitant of the peninsula, and *C. cristata*, M'Clelland, of Assam.

189. *Mycteria australis*. Not rare within a short distance.

190. *Anastomus typhus*. Not rare within a short distance.

191. *Platalea leucorodia*. Not common, but more so in the Soonderbuns. This and the two preceding species are closely allied by affinity to the next or Ibis group.

192. *Tantalus leucocephalus*. I have hitherto obtained but one specimen of this fine species.

193. *Ibis Macei*. Not uncommon.

194. *I. falcinellus*. Not uncommon. The ferruginous colour characterizes the summer plumage only of adults of this species.

195. *Esacus recurvirostris*; *Pseudops* (olim *Carvanaca*) *grisea*, Hodgson. I believe that this species occurs, but not commonly, within a moderate distance up the river.

196. *Œdicnemus crepitans*. I obtained one specimen last cold season in the bazar.

197. *Pluvianus cinereus*, nobis, J. A. S. B. xi. 587. Rather rare.

198. *Pl. Goensis*. Common.

199. *Pl.* (*Lobivanellus*) *bilobus*. Rare.

200. *Charadrius Virginianus*, apud Jardine and Selby, being the Indian representative of *Ch. pluvialis*. Very common.

201. *Ch. rufinus*, nobis. Somewhat rare.

202. *Ch. rufinellus*, nobis. Very common.

203. *Ch. minor*; *Ch. Phillipensis*, Jerdon. Common.

204. *Ch. Cantianus*. I obtained a fine pair, separately, during last March.

205. *Squatarola cinerea*. Not common.

206. *Himantopus melanopterus*. Common.

207. *Recurvirostra avocetta*. Far from rare.

208. *Totanus glottoides*. Very common.

209. *T. Horsfieldi*; *Limosa Horsfieldi*, Sykes. This delicate little greenshank is abundant.

210. *T. fuscus*. Tolerably common.

211. *T. calidris*. Very common.

212. *T. glareola*. Excessively common. Several dozens may be procured almost daily at the bazar for four or five months successively.

213. *T. ochropus*. Somewhat rare.

214. *T. hypoleucos*. Less rare than the last, but still far from common.

215. *Limosa melanura*. Tolerably common.

216. *Terekia Javanica*. Rare. I have obtained three specimens in the course of two cold seasons.

217. *Tringa subarquata*. Tolerably common.

218. *Tr. platyrhyncha*. During the first cold season I obtained

but one specimen of this species, but in the second a considerable number have been brought to the bazar; two or three specimens, and sometimes more, being commonly met with of a morning.

219. *Tringa minuta*. Extremely common.

220. *Tr. Temminckii.* During the first cold season I obtained but three or four specimens of this species, but in the second they have been tolerably common.

N.B. I have recently received from Mr. Jerdon a specimen of *Tr. canutus* from the vicinity of Madras.

221. *Machates pugnax*; *Tringa Hardwickii*, Harwicke and Gray, the male, or ruff,—and *Tr. Indica*, ibid., the female, or reeve. Tolerably common, but never met with in breeding plumage.

222. *Numenius arquata*. Common.

223. *Scolopax Gallinago*. Very common.

224. *Sc. heterura*, Hodgson. Common, especially about the commencement and close of the cool season.

225. *Sc. gallinula*. Not rare.

226. *Glareola torquata*. Now and then met with.

227. *Gl. orientalis*. Two or three great heaps of this species were brought to the bazar during last February.

228. *Parra Sinensis*. Tolerably common. I have only seen what is currently regarded as the adult plumage during the hot and rainy seasons, the considerable number brought during the cold season being all in what is considered the immature plumage; but I cannot yet assert that they moult back from the former into the latter.

229. *P. Indica*. Less numerous than the last, but still tolerably common. The adult garb of this species I have obtained at all seasons, the young having been described as a distinct species—*P. arata*, Tickell.

230. *Fulica atra*. Common.

231. *Porphyrio smaragnotus*. Common.

232. *Gallinula chloropus* (?). Common. The size appears to be constantly inferior to that of the European birds.

233. *G. Javanica*. Common.

234. *G. lugubris*, Horsfield. Not rare, as I have been informed, inhabiting the rice-fields; but I have hitherto obtained but one specimen in the neighbourhood.

235. *Porzana rufescens*; *Rallus rufescens*, Jerdon. I have obtained one specimen.

236. *P. maruetta*. Common.

237. *P. rubiginosa*. Not rare.

238. *P. Baillonii*. Common.

239. *Rallus aquaticus*. Apparently not common.

240. *R. gularis*. I have obtained one beautiful pair.

241. *Phœnicopterus ruber*. I have obtained several specimens in the bazar.

242. *Anser Indicus*. Common.

243. *A. cinereus*. Less so, but not rare.

244. *Dendrocygna major*, Jerdon. Somewhat rare.

245. *D. arcuata*; *Mareca awsuree*, Sykes. Very common, associating in large flocks.

246. *Nettapus Coromandelicus*; *Anas girra*, Hardwicke and Gray. Very common. It is remarkable that this bird seems totally incapable of standing or walking upon the ground. I have had dozens of them together, unwounded, together with other species, but the girras invariably fluttered along the ground in a strange scuffling manner, like a wounded bird, though I am told they perch with facility on trees. They always descend into the water, never alighting on the ground of their own accord. The *N. affinis*, Elliot, is merely the winter plumage of this species, wherein the collar is absent.

247. *Casarca rutila.* Common.

248. *Tadorna Bellonii.* Somewhat rare, five or six specimens only appearing in the bazar in the course of a season.

249. *Plectropterus melanotos.* Rare.

250. *Anas caryophyllacea.* Rare.

251. *A. pœcilorhyncha.* Not common.

252. *A. stepera.* Tolerably common.

253. *A. acuta.* Rather more so.

254. *A. querquedula.* Very common.

255. *A. crecca.* Not rare.

256. *A. penelope.* Rather uncommon.

257. *A. clypeata.* Not uncommon.

258. *Fuligula rufina.* Not uncommon.

259. *F. ferina.* Not common.

260. *F. nyroca.* Immense numbers of this species were brought to the bazar during the first cool season, but comparatively very few in the second.

261. *F. cristata.* Rather uncommon.

262. *Podiceps minor.* Abundant.

263. *Plotus Vaillantii.* Not rare. I have kept a living specimen for several months, which is still doing well.

264. *Phalacrocorax Javanicus.* Common.

Ph. carbo is, I believe, to be met with; and I have described a species as *Ph. leucotis*, which there is reason to infer is found in this neighbourhood.

265. *Pelecanus onocrotalus.* The museum contains a fine specimen purchased in the bazar.

266. *P. rufescens.* Not uncommon.

267. *Sterna melanogaster*; *St. Javanica*, Horsfield. Occasionally met with on the river.

268. *St. seena*, Sykes. Now and then obtainable.

269. *St. Caspia.* I have seen this noble species on the wing, as before mentioned.

270. *Sterna anglica.* I have obtained one pair.

271. *Viralva Indica*, Stephens. Tolerably common.

272. *Larus ichthyiaëtus*; *L. Kroikocephalus*, W. Jameson. The museum contains specimens procured in the neighbourhood.

273. *L. brunnicephalus*, apud Jerdon. Tolerably common.

274. *L. ridibundus.* I have procured one example.

This list of birds would doubtless have been considerably augmented, had I devoted my time more exclusively to ornithology, or

if I had personally hunted for them oftener, to judge from the success which has attended my few attempts in this way; but I have the whole vast range of zoology to engage my attention, to the extent of my abilities, and to that of my physical capabilities in this climate, which does not permit of such exertions as, in Europe, would be easily practicable. Indeed, I have had experience of the penalties which too much enthusiasm, under a burning sun, is apt to entail. Several species have been here indicated by name, which have long been described by me, but are not yet published, though they probably will be before this article is printed; and to the 'Journal of the Asiatic Society of Bengal' I therefore refer the reader for the descriptions adverted to. The present list has also been hastily drawn up, under pressure of other occupation; but I know full well how little chance I have of a season of coming leisure, and have therefore obeyed at once the impulse to prepare such a catalogue as I have now the pleasure of submitting to the notice of the readers of the 'Annals and Magazine of Natural History.'

Calcutta, April 13, 1843.

XXI.—*Descriptions of two species of British* Jungermanniæ. By Thomas Taylor, M.D., Dunkerron, Kenmare*.

Jungermannia fragilifolia, *MSS. T. T.* Caule procumbente, subpinnato; ramis complanatis, alternis, remotiusculis, subcurvis: foliis patentibus, subimbricatis, adscendentibus, ex angustiori basi oblongo-rotundatis, recurvatis, integerrimis; auriculis oblongo-galeiformibus; stipulis obovato-rotundatis, apice bifidis, integerrimis: foliis perichætialibus obtuse pauci-dentatis; calyce obovato-cordato, tubifero; perigonio subrotundo.

On mural rocks, accompanied by *Jung. dilatata* and *Jung. Tamarisci*, near Dunkerron, county of Kerry, 1829.

This species scarcely exceeds half an inch in length, is of a dusky reddish-brown colour, and collected into thin patches firmly attached to the rock's surface, or more rarely to the barks of trees. The branches are scarcely disposed in a pinnate manner, they are sometimes fastigiate on one side. When wet the leaves ascend so as not to touch one another, hence any pressure on their surface is felt on the points of their connexion with the stem; such connexion is so frail that the top of the finger pressed against the surface of the wet plant removes a multitude of leaves adhering, so that, however paradoxical it may appear, a blind man may recognise this species. The cells of the leaves are large in proportion to the size of the plant; and a few of the cells, sometimes disposed in lines as in *Jung. Tamarisci*, at other times irregularly dispersed, are larger, more opake, and more intensely coloured

* Read before the Botanical Society of Edinburgh.

than the rest. The perigonia are reniform or nearly round, and fixed to the side of the stem by a very short peduncle. The perichætial leaves have but few large and obtuse teeth. The calyx rises from a narrow base into an obcordate form. The calyptra is colourless except at the summit, about the base of the style, where it has the reddish-brown hue of the leaves. The capsule is globose, 4-valved, and in all respects like that of *Jung. Tamarisci.* From this last, *Jung. fragilifolia* may be readily distinguished, —1. by the wider cellulation of the leaves; 2. want of lustre; 3. fragility of the wet leaves; 4. larger auricles in proportion to the leaves; 5. the plane margins of the stipules; 6. the greater relative size of the perigonia to the plant; 7. the large and obtuse teeth of the perichætial leaves; and 8. by the abnormal cellules being much larger.

Jungermannia germana, *MSS. T. T.* Caule procumbente, bipinnatim ramoso; ramis complanatis, brevibus, patentibus: foliis imbricatis, ovato-rotundatis, integerrimis; auriculis oblongo-ovatis, ventricosis; stipulis obovatis margine recurvis, apice bifidis; foliis perichætialibus integerrimis; calyce oblongo-ovato, tubifero; perigonio lineari-ovato.

On rocks and on trees; very common near Dunkerron, county of Kerry, 1832.

The plant is three inches and sometimes more in length, and matted into patches sometimes a foot in breadth. It is never so black or so shining as *Jung. Tamarisci.* The fertile stems are longer, more branched and more fastigiate; whilst those bearing *perigonia* are far narrower and with shorter branches. The leaves are thin, and do not present the linear mark of enlarged opake cells as in *Jung. Tamarisci.* The stipules are wider than the stems, and the recurvation of their margin chiefly observable towards the summit. The margins of all the perichætial leaves are quite entire. The *perigonium* is a linear spike as in *Jung. dilatata,* Hook.

A very common species, hitherto confounded with *Jung. Tamarisci,* but readily distinguished when attention is paid to the ntire perichætial leaves, to the linear *perigonium,* as well as to the lighter colour and want of lustre of the leaves.

XXII.—*On the Anatomy of the Pearly Nautilus.* Communicated by W. Vrolik, Professor of Anatomy in Amsterdam.

To the Editors of the Annals of Natural History.

Gentlemen, Dublin, July 27, 1843.

I presume that it will be agreeable to you to receive some details on the anatomy of the Pearly Nautilus (*Nautilus Pompilius*),

which I have had the opportunity of dissecting some time ago at Harlem, with my colleagues Van Breda and Reinwardt. Although the dissection is not completely finished, and I reserve for a more extended memoir the filling up of the hiatuses which I am now obliged to leave, I have thought it convenient to give a brief *resumé* of the principal facts which we have observed, as it may tend to determine the differences of opinion which seem to exist on the subject; and I take advantage of my visit to England to communicate to you the extract of our observations, which M. Van Breda has been so good as to send me for that purpose from Harlem on the 24th of July.

I must first inform you that the Academy of Sciences at Harlem has received two complete specimens of the Pearly Nautilus; the Society owes one to the kindness of M. Serrière, Governor of the Mollucca Islands, who, learning from the Annual Report of the Harlem Society their desire to possess a complete example of that interesting animal, generously transmitted one that had been caught by a hook in the bay of Amboyna. It has been deposited in the museum of the Society.

The second specimen was bought by Colonel Boelen of a fisherman, who had also taken it at a depth of many fathoms in the same bay. This Nautilus lived two days on board the Boreas, of which M. Boelen is the commander. It was preserved with great care in spirits of wine, and after having been drawn by M. Verhuell it was submitted to my scalpel. The principal results of its dissection are,—

1. That the chambers of the shell contain only gas. We opened several under water; the gas which we collected contained a greater proportion of azote than the atmospheric air does. M. Van Breda, who analysed it, did not detect the slightest trace of carbonic acid.

2. That the animal is attached to the shell only by the siphon. The two muscles, by which it should adhere to the shell, according to the opinion of many naturalists, are applied only to the horny membrane or girdle, which Owen has so well described in his remarkable work*. This membrane does not itself adhere to the shell, so that there is no difficulty in detaching the horny membrane in question without the slightest laceration, both from the surface of the muscles and from that of the shell between which it is situated.

3. That the structure and position of the internal organs are, in general, such as Owen has described in his admirable memoir.

4. That the two mandibles are horny, but covered by a bluish calcareous matter, which had evidently been lost in the speci-

* Memoir on the Pearly Nautilus, 4to, 1832, p. 9.

men described by Valenciennes*, but which Owen has also observed†.

5. That the number of the apertures of the pouches adjacent to the pericardium is such as Valenciennes‡ has stated, so that Owen § seems to have been mistaken with respect to their number. It has also seemed to us that the pouches do not communicate with the pericardium, but that they are blind sacs, without any other apertures than those which communicate with the branchial sac; facts also observed by Valenciennes.

6. That the anus is by no means situated as Valenciennes has figured it ||, viz. at the bottom of the fissure formed by the two muscles; but that it is, on the contrary, placed at a great distance from that part, close to the lamellated organ, which Owen states to be in relation with the oviduct and in the semilunar fissure formed by that organ.

7. That there is a distinct foramen in the pericardium, precisely similar to that which Owen¶ has described and figured, and which Valenciennes, consequently, erroneously denies. However, I am not certain that it communicates with the siphon; and I regret that the animal, being detached from the siphon, it was not possible for us to determine whether the hypothesis which Buckland** has proposed, in accordance with a drawing by Owen, is quite accurate. It is a point which deserves to be studied afresh. With respect to the foramen itself of the pericardium, it cannot be doubted that it exists, and that it gives passage to an artery. Requesting, Gentlemen, that you will insert this letter in your estimable Journal,

I have the honour to be, your obedient servant,

W. Vrolik.

XXIII.—*Description of the Lurking Machete* (Machærium subducens) *from the northern coast of New Holland.* By John Richardson, M.D., F.R.S. &c., Inspector of Naval Hospitals.

[With a Plate.]

The fish which forms the subject of this notice inhabits, in small numbers, the various bays of Port Essington, where it lurks under the mud in shallow waters. The aborigines name it "Ambeetunbeet." Mr. Gilbert, assistant to Mr. Gould, brought home a single specimen of the dried skin of one side, which was presented

* Nouvelles Recherches sur le Nautile flambé, 4to, 1839; Archives du Muséum, tom. ii. p. 279.

† *loc. cit.* p. 20.

‡ *loc. cit.* p. 285.

§ *loc. cit.* p. 27.

|| *loc. cit.* pl. 10. fig. 1. *w.*

¶ *loc. cit.* p. 27. pl. 5. *o.*

** Bridgewater Treatise, pl. 34.

by Mr. Gould to the British Museum. It is from this example alone that the following description of the species was taken. The want of anatomical details prevents me from pointing out the systematic position of the fish with any confidence; but in a short paper which was read at the Manchester Meeting of the British Association in June 1842*, I stated, on the strength of external characters only, that it most probably belongs to a generic or subgeneric group of the *Ophidia*, and that it bears a strong general resemblance to the *Echiodon drummondii* of Thompson, though its dentition is dissimilar. The genus *Ophidium*, which is ranged by Cuvier with the *Anguilliformes*, ought perhaps, with the addition of the Machetes, Echiodons, Fierasfers, and some other fish, to form a proper family near the *Gadidæ*, and likewise to the Blennies, which should also be removed to that part of the system, as I have hinted in the paper quoted above. The more remarkable characters of *Machærium* may be summed up as follows :—

Piscis malacopterygius, apodus, ensiformis, squamosus. Apertura branchialis satis magna sub gula extensa. Radii membranæ branchiostegæ sex. Opercula conspicua. Os modice extensivum. Dentes parvi, uniseriales in ossibus intermaxillaribus et in maxilla inferiore, quæ rictum efficiunt, ordinati. Genæ et regiones suprascapulares squamosæ. Pinnæ verticales coalitæ, radiis spinosis nullis. Pinna dorsi per totum fere dorsum regnans. Linea lateralis brevis super anum desinens.

MACHÆRIUM SUBDUCENS (*Rich.*), Lurking Machete. Plate VI.
Rep. Brit. Assoc. for 1842, p. 69.

Form elongated and compressed like a *Gunnellus* or *Ophidium*, and similar to a straight sword or butcher's knife, whence its generic appellation †. The profile of its body is semilanceolate, and its greatest height, which is to be found a short way before the vent, is comprised $9\frac{1}{2}$ times in the total length of the fish. The tail, though regularly lanceolate, is not acute. The exact degree of compression of the body cannot be determined from our solitary specimen, owing to the manner in which it has been prepared.

The head, blunt and somewhat less high than the body, is evidently considerably compressed. Its anterior extremity is formed by the tips of the jaws, the lower jaw being rather the longest; its upper profile descends from the line of the back by a low convex curve; its under profile is flattish. The rictus of the closed jaws runs backwards and slightly downwards to beneath the centre of the eye. It is formed above by the strong intermaxillaries, whose stout tapering pedicles equal the dental portion in length, and

* Vide Report of the Twelfth Meeting, Transactions of Sections, p. 69.
† Th. *μάχαιρα gladius.*

work backwards over the orbits. The maxillary lies entirely behind the intermaxillary, is less strong and is nearly of equal width throughout, except that a shoulder projects anteriorly from its upper third. A knob close to its articular condyle projects into the roof of the mouth. The under jaw is still stronger than the upper one, and runs far back, behind the eye, a small heel projecting beyond its articular cavity and forming a point on the side of the gill-membrane. About five pores exist on its flat under-surface. The lips, covering both jaws, are tolerably thick, and of a clear greenish colour even in the dried specimen. The under one folds back on the sides of the jaw, but the fold does not extend round the symphysis. The round eye, having a diameter equal to one-sixth of the length of the head, is placed two diameters behind the tip of the upper jaw, near the profile, but not interfering with it, and three diameters before the gill-opening. Suborbital chain narrow, smooth, subtubular, but not distinctly porous. The preorbital embraces a quadrant of the orbit, and is wider than the rest of the chain; its width is increased at its posterior end, under the centre of the eye, by a descending corner. Top of the head smooth and rounded off laterally, particularly behind the eye. Cheek large, scaly, quinquelateral. It is bounded above by a line running horizontally between the upper third of the orbit and the upper end of the preoperculum; posteriorly by the nearly upright, slightly curved, narrow disc of this bone; inferiorly by nearly one-third of the length of the lower jaw, and anteriorly by the lower half of the maxillary below and the orbit above. Its scales are similar in size and tiling to those of the body. The space bounded by the upper edge of the operculum and the scapular and suprascapular bones is also similarly scaly. The gill-covers and the rest of the head are clothed with smooth skin. A curve in the upper third of the preoperculum gives its lower part a slight inclination forwards. The interoperculum is parallel to the lower half of the preoperculum and swells into a rounded ridge, whose end appears to form a fulcrum or joint on which the projecting heel of the lower jaw moves. The suboperculum has a curved exterior edge, a subquadrate disc, and the process which rises before the operculum swelling into a rounded ridge. The operculum is triangular, with two smooth rounded ridges diverging from its articular angle, one bounding the bone anteriorly, the other running near its upper edge, and ending in a flat, obtuse, slightly projecting tip. The posterior edge of the bone, beneath this tip, has a slight sigmoid flexure. There are no spinous points on any of the bones of the head. The gill-flap is bordered by membrane, which at its upper part unites with the branchiostegous membrane and the integuments of the humeral chain, closing the gill-opening down to the bend of the co-

racoid bone or upper axilla of the pectoral fin. The lower edges of the suboperculum and interoperculum are free and overlap the conspicuous gill-rays, which are six in number, strong, round and curved. The gill-opening, though low, is moderately large, and extends forwards to beneath the joint of the lower jaw. The humeral chain consists of suprascapular, scapular and coracoid.

The scales are cycloid, tiled, exposing a longitudinally elliptical surface and firmly imbedded in the skin. There are about thirty in a vertical row. The lateral line is composed of fifty small eminences, and terminates opposite to the tenth dorsal ray.

Rays :—Br. 6; D. 70; A. 59; C. 9; P. 10; V. 0.

All the rays of all the fins are jointed: the first rays of the dorsal and anal are simple; the other rays of these fins are divided at their tips into about four branches which do not spread, and the rays are slender and stand well apart in the strong membrane. The dorsal rays increase gradually in length from the first to near the middle of the fin, after which they continue equal to the end of the fin. The anal is more nearly equal throughout. Both fins are pointed at the end, but the points are not conspicuous, the space between them being filled by the caudal fin, whose rays are much finer, more crowded and somewhat shorter. The pectoral is small and rounded, its rays slender, crowded and branched. The interspinous bones of the back correspond in number with the dorsal rays.

Dimensions.	inches.
Length from intermaxillary symphysis to end of caudal fin...	13·80
——— base of ditto	13·38
——— beginning of anal .	4·50
——— centre of anus......	4·25
——— beginning of dorsal	2·35
——— gill-opening	1·65
——— centre of eye	0·65
Length of rictus of mouth	0·60
——— lower jaw	1·15
Diameter of eye	0·22
Height of head	0·95
——— body about	1·30
——— dorsal fin posteriorly	0·60
——— anal fin	0·35
Length of pectoral fin	0·45

XXIV.—*Additional Observations on the Polygastric Sacculi.* By John Wm. Griffith, M.D., F.L.S. &c.

To the Editors of the Annals of Natural History.

Gentlemen,

A paper having been inserted in the last number of your Journal (p. 104) by Mr. Addison, tending to the conclusion that the inaccu-

rate interpretation I attributed to him was rather my own, I crave the favour of a few lines to reply. In the first place be it noticed, that the quoted remarks relating to this part of the subject in my paper were extracted (as distinctly stated) from the 'Prov. Med. Journal' for 1842, as read before the British Association; therefore observations since made in any 'Experimental Researches' published in the following year, clearly can have nothing to do with the matter. It must also be observed, that my observations were on the Polygastrica, not on *Paramœcium,* although what applies to one will, I believe, apply to the whole.

My object in adducing "physical reasoning" was not to attempt to show what any living structure could or could not do, because I appealed to experiment and observation first, and subsequently applied reasoning to explain what I saw; the explanation of the *causes* of which appearances must be sought in reasoning alone.

As regards the bursting of pollen grains when acted on by solution of potassa, this is again a decided misinterpretation, and the cause of this appearance is only to be found in repeated experiment and careful reasoning. When water, solution of potash, or acid are added to pollen grains, imbibition and swelling take place; when water, acid, or weak potash water are used, the pollen tubes are generally thrust out at the same time, and the fovillary matter can be seen within; but when a stronger solution of potash is added immediately as the pollen tube begins to be emitted, it is deprived of its covering of intine by the solvent action of the reagent, and the fovillary particles are emitted, thus giving the appearance, which, hastily interpreted, is called bursting. The physical reasoning *is* therefore equally cogent as regards the pollen and the animalcules. The "vesicular" appearance seen in the animalcules after the addition of potash can also be seen in the case of the pollen, and when the solution is not sufficiently strong to dissolve the intine covering of the pollen tube, the whole grain shrinks or becomes contracted. When we neutralize the liq. potassæ exactly with nitric acid previously to adding it to the Polygastrica (whereby the solvent action of the liquid is destroyed, but its density not materially interfered with), we have exosmosis produced, *i. e.* instead of swelling they become contracted and shrivelled. This is a very interesting fact, and clearly shows that the density of the liquid cannot be concerned in the production of the "imbibition," but that it must be attributed solely to the chemical action of the potash. I may here recall to the reader's mind, in conclusion, the object I had in making any observations relative to the "imbibition" which was stated to take place in the polygastric sacculi,—it was to disprove the conclusion arrived at by Mr. Addison, viz. that these "stomachs"

perform their function by imbibition, which, I believe, in my former paper I showed to be thoroughly unfounded.

Your obedient servant,
J. W. GRIFFITH.

XXV.—*Observations on the genus* Mougeotia, *on two new Genera of Freshwater Algæ, and on* Tyndaridea, *with descriptions of species.* By ARTHUR HILL HASSALL, Esq.

[With a Plate.]

Genus MOUGEOTIA.

THE real nature of the genus *Mougeotia* does not hitherto appear to have been at all understood, and consequently the definitions given of it up to the present time are either erroneous or incomplete.

Vaucher thus defines the genus *Mougeotia* :—" *Conjuguées à tube intérieur.*" And Agardh as follows :—" *Fila articulata reticulata conjuncta, granulis absque ordine dispositis, fructibus in angulis reticuli collocatis.*"

The first of these definitions is imperfect, and the second inaccurate, inasmuch as it contains a reference to perfect fructification distinct from the granules or zoospores.

The true and original species of the genus *Mougeotia* are all characterized by the singular fact, that sporangia, which Agardh calls the fruit, are never found in them as they are in all other species of the conjugating tribe of Confervæ. The filaments do indeed unite, but no transference of the contents of one cell into the interior of the other, and consequently no formation of sporangia, ever take place.

This remarkable circumstance in the history of the genus *Mougeotia,* resting as it does on long-continued and careful observation of the species composing it, does not admit of the smallest doubt, and although not absolutely stated as a fact, is yet strongly implied by Vaucher in his description of *Mougeotia genuflexa,* in which the following observations occur :—

" This *Conjugata* has not presented to me the round globules of the other species of the same family; on the contrary, the green matter which it incloses hath appeared to me to present nearly the same form, so that I know not how the grain is formed, nor in what way the development in this species is brought about; only I have remarked distinctly three or four bright grains immersed in this green matter, and I have seen in the month of April the cells separate from each other and sink in the water, but I traced them no further. Nevertheless, I have difficulty in believing that the brilliant grains are not the germs.

" Since writing this description I have seen the germination of

this *Conjugata* elsewhere in a manner very different from all the others: the matter does not pass from one tube to another neighbouring tube, but each cell itself furnishes a single young plant, the interior tube which it was found to enclose becoming a young *Conjugata* which was entirely contained in the old tube, as it itself contains the plants which are afterwards to become developed; it issues by the extremity when it occupies the last cell, and by the sides when it is found in one of the central cells."

With respect to the observations of Vaucher in reference to the germination of the young Conferva while still within the parent cell, I would observe that I have never witnessed this singular development, and can confidently assert that this is not the legitimate or normal mode of development of the species of the genus *Mougeotia,* which is by zoospores, developed external to the cells, as in other Confervæ.

The above-detailed facts connected with the genus *Mougeotia,* when viewed in connexion with other singular circumstances exhibited by other abnormal forms of Confervæ, are in the highest degree important, from the light which they throw upon the hitherto obscure physiology of this wide-spread class of Nature's productions—proving as they clearly do the interesting fact, that *each cell of* EVERY *Conferva contains all the requisites for the perpetuation of the species.* Thus the occurrence of certain non-conjugating species in the genus *Zygnema* proves that union of the filaments is not essentially concerned in the continuation of the species of that genus; while the single example met with in the same genus of a species in which sporangia are formed without either union of the filaments or commingling of the contents of two cells—that is, are formed separately in each cell—clearly testifies that this concentration of the endochrome of two cells is likewise unessential to the continuance of the species of the genus *Zygnema.* Still further light is shed upon the reproduction of the Confervæ by *Mougeotia ericetorum,* the filaments of which do not generally conjoin, but in which sometimes a union of the matter of two cells in the same filament does take place, without however any subsequent formation of sporangia; the absence of sporangia in this, as well as in the other species of the genus *Mougeotia,* which differ however from *M. ericetorum* in that union of the filaments does invariably occur, but unaccompanied by transference of the endochrome, affording a proof conclusive of the fact that the formation of sporangia is not indispensable to the reproduction of the conjugating tribe of Confervæ any more than such sporangia are to that of the branched kinds, in which there is no union of filaments, no transference of endochrome, and no formation of sporangia. In the branched species, there-

fore, the reproduction of the Confervæ is reduced to its simplest form.

The only purpose which can be recognised as being fulfilled by the union of the filaments in *M. genuflexa,* &c. is, that thereby an opening is effected in the cells through which the zoospores can escape on their separation from those cells.

I now propose, therefore, that in the genus *Mougeotia* should be placed only such species of conjugating Confervæ as are characterized by the interesting fact of the non-formation of sporangia. These species include the original and typical species of the genus, *M. genuflexa, M. compressa,* as well as *M. brevior, M. dubia, M. flava* described in a previous paper, and *M. ericetorum,* of which a detailed description will here be given.

The genus *Mougeotia* may be thus defined :—

Gen. Mougeotia.

Gen. char.—Filaments of equal diameter, rarely branched ; cells usually conjugating ; transference of endochrome rare ; sporangia none ; endochrome at first filling the cavity of the cell, but subsequently contracting into an irregularly spiral thread ; zoospores scattered without order through the colouring matter.

M. ericetorum. Filaments not unfrequently branched ; cells usually about twice as long as broad, rarely uniting, but frequently emitting elongated and irregular processes, which are usually to be regarded as rudimentary ramuli ; endochrome frequently becoming effused, generally from one cell into an adjoining one in the same filament, but sometimes that from both cells passes into a space formed between the two utricles.

It has elsewhere been stated that I had been induced, from the detection of ramuli on some of the filaments, to consider *Conferva ericetorum* as referable to the branched Confervæ. It would appear, however, on closer examination, that while it certainly, by the not unfrequent occurrence of ramuli, exhibits a degree of relation to those species, that yet its affinities with the conjugating tribe are sufficiently strong to make it apparent that its proper station is with these, and not with the branched species.

When a communication is about to be set up between two cells in the same filament, the opposed extremities of those cells are first seen to become slightly inflated, to point somewhat and then burst, effusing their contents sometimes into a space which is gradually between the two cells, but at others the endochrome of one cell passes directly into the cavity of the other.

All the cells in a filament do not usually communicate with each other at the same time, but at distant intervals ; and around those cells between which a communication is about to become

established, the investing membrane is observed to be thickened considerably, pointing out to the observer those cells which either have, or are about to take on, the characters of reproduction.

At one time I thought that the branches which I have so often met with were spurious, and might have been formed in the same manner as they sometimes are in *M. genuflexa*, &c., viz. by the union of the extremities of certain filaments at right angles with the cells of other filaments; but this idea was dispelled by observing, that in the specimens in which the branches occurred most abundantly, no union of cells in the regular way was to be met with.

The colour no less than the condition of the endochrome varies considerably in this species. In some specimens the filaments are of a bright green, in which case they have always been found immersed in water; while in others, and more frequently, they are purple; which they invariably are when found spreading over swampy heaths. Specimens of a beautiful green colour were recently sent me by Mr. Jenner and Mr. Ralfs, and these for some time puzzled me exceedingly.

Notwithstanding that I have thought it right to place *C. ericetorum* in the genus *Mougeotia*, it yet must be acknowledged that it differs in several respects from the other species of the genus: thus it differs in its habit and in its persistent vitality, which enables it to live under circumstances which would be fatal to the vast majority of Confervæ, such as exposure to drought and heat; it differs also in the occasional presence of ramuli on the filaments and in the transference of the endochrome; but all these differences are, I think, only of specific value, and are more than outweighed by the correspondence in the important fact of the non-formation of sporangia.

I have no hesitation in referring to this species the *C. purpurascens* of Carmichael, which is but an aquatic condition of the plant, and strongly suspect that *Conf. tortuosa*, Dillw. (the *Zygnema littoreum*, Lyngb., and *C. perreptans*, Carm.) might be referred to it likewise.

Nov. gen. Staurocarpus.

Gen. char.—Sporangium either square or cruciform, and lodged in the transverse tubes.

Certain square or cruciform species of conjugating Confervæ were doubtfully associated by Agardh with the genus *Mougeotia*; these species I learned long since had been separated from it by Mr. Shuttleworth under the appropriate generic appellation of *Staurocarpus*. Mr. Shuttleworth however did not, so far as I can learn, publish his opinion of the propriety of establishing for these

curiously formed species a distinct genus, contenting himself with communicating his views to some of his correspondents, of whom I may name the following as being conversant with those views: Mr. Borrer, the Rev. M. J. Berkeley and Mr. Ralfs. Within these few days I have been informed by Mr. Berkeley that Kutzing has proposed this genus under the term of *Staurospermum* in a sketch of a work on the Algæ, inserted in the first number of the new series of 'Linnæa.' No account of the genus is given by Kutzing, but merely the name and an enumeration of species belonging to it. Mr. Shuttleworth's appellation I conceive to be much more appropriate and accurate than that of Kutzing, and have therefore ventured to retain it; for the word *Staurocarpus* applies to the fructification generally, which is either square or cruciform, while *Staurospermum* appears to me to specify the reproductive granules or zoospores themselves with which each sporangium is filled, and which are more or less of a circular form.

That Agardh entertained a very strong suspicion that the square-fruited species ought to be separated from the genus *Mougeotia,* will be apparent from the following observations:—

"Ceteræ species quoad fructum non satis cognitæ, et postea forsan separandæ, huc tantum ob habitum retentæ."

The genus *Staurocarpus* differs from *Mougeotia* in the facts of the transference of endochrome and formation of sporangia, while from the genus *Sphærocarpus,* hereafter to be described, it is separated by the form of the sporangium.

But one species of this genus is described by British writers. In a recent number of the 'Annals' I added two others, and I have now the pleasure, assisted by my valued colleagues Mr. Ralfs and Mr. Jenner, of describing three other species of the genus.

St. glutinosus. Synonym, *Mougeotia glutinosus.* For description see 'Annals and Magazine of Natural History,' vol. x.; and for figure, Plate VII. fig. 1.

St. capucinus. Filaments of less diameter than those of *St. glutinosus*; cells usually eight or ten times as long as broad; endochrome generally of a purple hue; sporangia cruciform, large, and filled with zoospores of a greenish colour. See Pl. VII. fig. 2.

Hab. Henfield, Mr. Borrer; Tunbridge Wells, Mr. Jenner; Penzance, Mr. Ralfs; High Beech, Essex.

This is a very distinct species, and appears first to have been described by Agardh under the name here adopted. A synonym of this species is undoubtedly the *Conferva cærulescens* of 'English Botany.' The colour of the filaments in this as in other Confervæ would appear to be subject to considerable variety, but is usually

a deep purple. It is distinguished from *St. glutinosus* by the form of the sporangium, size and colour of the filaments *.

St. virescens. For description see 'Annals and Magazine of Natural History,' vol. xi.; and for figure, Pl. VII. and fig. 3.

Synonym, *Mougeotia quadrangulata*, 'Annals and Magazine of Natural History,' vol. xi.

This is readily distinguished from the two preceding species by its much smaller size.

St. ———. Filaments usually of a green colour and smaller diameter than those of *St. affinis*; cells before conjugation about eight or ten times as long as broad, but after that period becoming much longer; sporangium cruciform. Pl. VII. fig. 4.

Hab. Pond near Roydon, Essex.

This species comes very near to *St. virescens*, from which it is distinguished by its somewhat finer filaments and cruciform sporangium, the sporangium in *St. virescens* being square.

St. gracilis. Filaments of finer diameter than those of *St. affinis*, and usually of a green colour; cells many times longer than broad; sporangia cruciform. See fig. 5.

Hab. Penzance, Mr. Ralfs; Rackham Bogs, Broadwater Forest, Fishers Castle, Parham Park, Mr. Jenner; High Beech, Hertford Heath, Wormly West End, and Wanstead Flats, Essex.

This is an abundant species, and very distinct from any of the others. It was found by Mr. Ralfs, Mr. Jenner and myself, within a few days of each other.

St. gracillimus. Filaments more slender than those of *St. gracilis*, and usually of a green colour; cells very many times as long as broad; sporangia cruciform, and about one-half the size of *St. gracilis*. See fig. 6.

Hab. Hertford Heath and High Beech, A. H.; Rackham Bogs and Parham Park, Mr. Jenner.

This species I have myself met with several times, but did not at first recognise its distinctness, of which however I now entertain no doubt; and it was only on the receipt of a beautiful sketch from Mr. Jenner, accompanied by remarks, that I examined thoroughly into the matter and satisfied myself of its entire distinctness.

Nov. gen. Sphærocarpus.

Cells filled at first with endochrome, which subsequently contracts and assumes an irregularly spiral form; sporangia circular, lodged in the transverse tubes.

* I have since ascertained that this species was *first* described in the 'English Botany.' I have, however, retained Agardh's name for it, the term *cærulescens* being rarely, if ever, applicable to it, and therefore likely to mislead.

The species of this genus, while they agree with *Staurocarpus* in the arrangement of the endochrome, yet differ very considerably from it in the form of the sporangium, and it is on this difference that I have ventured to found a new genus. From those species of *Tyndaridea* whose sporangia are likewise formed in the connecting tubes, the genus *Sphærocarpus* is distinguished by the dissimilar disposition of the endochrome.

Sph. scalaris. For description see 'Annals and Magazine of Nat. Hist.' vol. x.; and for figure, Pl. VII. fig. 7.

Hab. Vicinity of Cheshunt and various other places, A. H.; near the Blackboys Turnpike-gate, Mr. Jenner.

I have recently received from Mr. Jenner what I regard as a variety of *Sph. scalaris.* The filaments are of the same diameter, but the sporangia instead of being oval are spherical. This may be distinct. See fig. 8.

Hab. Croboro' Warren, Mr. Jenner.

Sph. intricatus. Filaments of less size than those of *Sph. scalaris*; cells five or six times as long as broad; sporangia oval, rather larger than those of *Sph. scalaris,* their long diameters being placed in the direction of the width of the cells. Fig. 9.

Hab. Broadwater Forest, Mr. Jenner.

The only differences to be detected between this *Sphærocarpus* and *Sph. scalaris* are the smaller diameter of the filaments and larger size of the sporangia, but these are I think of a sufficiently well-marked character to justify its being ranked as a distinct species. This species has only as yet been found by that indefatigable observer Mr. Jenner.

Sph. recurvus. Filaments of smaller size than those of *Sph. intricatus*; cells six or seven times as long as broad; sporangia circular. Fig. 10.

Hab. Penzance, Mr. Ralfs; Rackham Common, Mr. Jenner.

This species I first received from Mr. Ralfs, and some two or three weeks afterwards it was sent me by Mr. Jenner. I regard it however as the species figured by Dillwyn (Supplement, pl. C.) as *M. genuflexa* in a state of reproduction.

Sph. depressus. Filaments rather larger than those of *Sph. recurvus*; cells six or seven times as long as broad; sporangia oval, small, their long diameter being placed in the direction of the length of the cells. See fig. 11.

Hab. Rackham Bogs, Mr. Jenner; Penzance, Mr. Ralfs.

There can be no doubt of the distinctness of this species, which was procured by Mr. Jenner some weeks before it was found and transmitted to me by Mr. Ralfs.

Sph. nummuloides. Filaments of rather larger size than those of

Sph. recurvus; cells about six times as long as broad, not usually recurved; sporangia circular and smaller than those of *Sph. recurvus*. Fig. 12.
Hab. Hertford Heath.

Sph. parvulus. For description see 'Annals and Magazine of Nat. Hist.' vol. xi.; and for figure, Pl. VII. fig. 13 and 14.

Sph. ovalis. Filaments about equal in size to those of *Sph. parvulus*; cells ten or twelve times as long as broad; sporangia slightly elliptical, their long diameter being placed in the direction of the length of the cells. See fig. 15.
Hab. Wimbledon Common.

The sporangia, although elliptical, are not near so much so as are those of *Sph. depressus*, and the filaments are not one-half so large.

Sph. angustus. Filaments much more slender than those of *Sph. parvulus*; cells very many times longer than broad; sporangia circular, very large in comparison with the size of the filaments. Fig. 16.
Hab. Penzance, Mr. Ralfs.

This is a very distinct species, and for its discovery we are indebted to Mr. Ralfs.

Genus Tyndaridea.

The species of the genus *Tyndaridea* may with great propriety be placed under two heads. Under the one should be arranged all those species in which the sporangia are formed within the cells, while under the second head those species should be placed in which the sporangia are lodged in the transverse tubes.

Vaucher, in his description of *Tyndaridea pectinata*, thus ingeniously, though I fear not satisfactorily, endeavours to account for the formation of sporangia in the transverse tubes:—"Les grains sont entièrement sphériques et un peu hérissées, ce qui sans doute est la cause pour laquelle elles sont retennues dans le canal de communication qui est entre les deux tubes."—*Vaucher*, p. 78.

I have now to describe four fine species belonging to this second division of the genus *Tyndaridea*.

* Sporangia lodged in the transverse tubes.

Tyndaridea conspicua. Filaments of considerable diameter; cells about one and a half or twice as long as broad; endochrome distinctly stellate; sporangia large, circular, and partly immersed in the cells. See fig. 17.
Hab. Wimbledon Common.

This species bears considerable resemblance to Vaucher's figure of *T. pectinata*; however, I do not think that it is that species, for I presume that Vaucher employed the same magnifying power to

all his figures, in which case the filaments of *T. pectinata* would be almost equal in diameter to those of *T. porticalis,* and consequently nearly as large again as those of the present species.

Tyndaridea immersa. Filaments rather smaller than those of the preceding species; cells usually twice or twice and a half as long as broad; sporangia usually spherical, but sometimes oval and entirely confined to the transverse tubes. Fig. 18.
Hab. Wimbledon Common.

Tyndaridea decussata. Filaments of less diameter than those of the preceding species; cells usually two and a half times as long as broad; sporangia circular, and a portion of them immersed either in one or other or both cells. See fig. 19.
Hab. Wimbledon Common.

This species may possibly be the *T. decussata* of Vaucher, in which however the cells are said to be four times as long as broad.

Tyndaridea Ralfsii. Filaments of less size than those of *T. immersa*; cells usually four times as long as broad; sporangia elliptical, their long diameter corresponding with the length of the cell. Fig. 20.
Hab. Penzance, Mr. Ralfs; near Cross-in-Hand and Chiltington Common, Mr. Jenner.

There is not a more elegant or beautiful species than this in the genus, and I have much satisfaction in dedicating it to Mr. Ralfs, its first founder, and a gentleman by whom our knowledge of the Algæ has been so considerably augmented.

XXVI.—*Note in reply to Mr. Hassall.*

By Prof. Edward Forbes, V.P.W.S., F.L.S., F.B.S. &c.

I regret that Mr. Hassall has taken in such apparent ill-humour my comments on two of his supposed discoveries. His observations, however, more and more convince me that he is mistaken in regard to the *Echinocorium,* and had not made himself acquainted with previous observations when he claimed the priority of discovery about the phosphorescence of zoophytes.

A word or two regarding each: I have met with the *Coryne* on shells not incrusted by *Alcyonidium echinatum* as well as those so invested: Mr. Hassall has not hitherto. This is just the state of the case about the association of *Adamsia maculata* with the *Pagurus,* and of the *Adamsia* with the remains of *Echinocorium,* but one negative observation (I have made many) upsets all his positions.

Mr. Hassall says, that he has convinced himself of the union between the *Alcyonidium* and *Coryne*; first, because marked depressions exist on the polypidom for the reception of the bases of

the polypes; 2nd, because the whole structure of the polypidom itself was porous and incrusted with a gelatinous material; and lastly, because it was invested by a membrane derived from the polypes themselves, and which likewise covered the muricated processes. If these were the grounds of his conviction he must be very easily convinced, since, admitting the correctness of the observations (which I am by no means inclined to do), they are all so many arguments against the genus *Echinocorium,* since they are quite contrary to the type of structure in the *Zoophyta Hydroida,* to which order the animal of his genus undoubtedly belongs. His logic too is singularly bad, for by his first argument he might prove the oyster-shell to be the polypidom of *Cliona*; and by the second, that a fucus had the same relation with a *Botryllus.* When I said that the *Coryne* could be separated from the *Alcyonidium* without injury, of course I meant without organic lesion; no other meaning would have been scientific. As to the separation of the *Alcyonidium echinatum* as a genus (it is a somewhat unphilosophic consolation, that though we are not right one way, we may be in another), I agree with Mr. Hassall that it probably should be, but we want more data ere we can constitute it satisfactorily. As to the *Coryne* being distinct, I also think it is, and three years ago showed a drawing of it to Dr. Johnston under that conviction. He was familiar with the form, but regarded it as a variety of *C. squamosa.* In order that there be no mistake in future about it, the best way is to constitute it a species at once, and name it after the industrious naturalist who has brought it so prominently forward.

Coryne Hassalli, nov. sp. C. corpore elongato, capite clavato, tentaculis brevibus albidis. L. 1—2 lin.
In mare Britannico profundiore.
Obs. Secundum Hassall, animal *Echinocorii,* genus Zoophytarum improbabile.

Now, as to the Phosphorescence of Zoophytes, I again repeat, that the general fact has long been known. It has been taught for years in the class-room of every natural-history and physiological professor at home and abroad. I taught it myself in my lectures in Edinburgh in 1838 as a familiar fact, not as a novelty. The masters under whom I had studied had taught me, and I had confirmed their observations on the sea-shore. Dr. Johnston's insertion of Stewart's paragraph is a sufficient indication of his recognition of the fact. Dr. Grant notices it in his published lectures. What can be more to the purpose than Dr. Carpenter's summary—"Sponges, *Sertulariæ, Pennatulæ,* and other Polypifera, exhibit some degree of luminosity" (Principles of Gen. Physiology, 1839)? If Mr. Hassall be, as he says himself, "not suffi-

ciently acquainted with foreign authors," he ought at least to be so with British ones, ere he sets up a claim for such familiar discoveries as the phosphorescence of zoophytes. The 'Dictionnaire des Sciences Naturelles' refers to British authors, and rather old ones too (as Shaw), on the very subject in dispute.

But I have another "Retrospective Comment" for Mr. Hassall, on a passage in his paper on Diseases produced by Fungi, in the last Number of the 'Annals.' He there writes—"The production of diseases through the agency of Fungi, whether in the animal or vegetable fabric, has not hitherto received that degree of consideration to which the frequency of their occurrence and the importance of the subject so eminently entitle them;" and again, "it has hitherto been supposed that their powers were confined to dead organic matter." Who would suppose from this, that only a year ago an elaborate memoir "On the Parasitic Vegetable Structures found growing in Living Animals" had been published in the Transactions of one of the Royal Societies of Great Britain (see Edin. Royal Soc. Transact., vol. xv. part 2. for a paper eighteen pages long, with two plates, by my friend Dr. J. H. Bennett)? Yet such was the case, and nearly fifty authors on the subject in question are referred to in that paper.

August 1843.

XXVII.—*Information respecting Scientific Travellers.*

[A NEWLY published Part of the 'Journal of the Royal Geographical Society' contains two narratives of an expedition to the Barima and Guiania Rivers, communicated by our esteemed correspondent the Chevalier Schomburgk* to the Colonial Office, from which we shall give some extracts relating to natural history.—ED.]

River Manari (a tributary of the Barima),
June 22, 1841.

The expedition under my direction left Georgetown on the afternoon of the 19th of April, in the schooner Home, which had been chartered for the purpose of conveying us to the Waini, or Guiania.

On the 28th of April we received the visit of a Warran chieftain from the Canyaballi, a tributary of the Waini, and about two days' journey from its mouth, who, having heard of our arrival, came with part of his men to visit us. The captain is known among the colonists of this part under the name of Sam Peter, and appeared a very intelligent old man. During the time occupied by the survey the weather had changed, and it now became apparent that the short rainy season had set in. We ascended the Waini to the remarkable passage which connects that river with the Barima; and which, although not navigable for sailing vessels, affords a ready communication, in boats and canoes, between the two rivers. This natural

* See also the notice in vol. x. p. 348.

channel may be compared, in some respects, to the Cassiquiare, which connects the Upper Orinoco with the Rio Negro, and it is known in the colony under the name of the Mora Creek. The Warran Indians, who inhabit these rivers, call it Morawan.

The Barima presented, where we entered it from the Mora, the appearance of a much larger river than I had expected. I estimated its breadth at 700 feet. Its water, still subject to the influence of the tides, was of a dark colour, and its depth from eighteen to twenty-four feet. About five miles from the junction of the Mora, the river Aruka flows into the Barima on its left bank. The two rivers, before they unite, are nearly of equal breadth—about 400 feet each. The Aruka has yellowish muddy water. A few houses, inhabited by Warran Indians, are within a short distance of the confluence of the Aruka with the Barima. They, with others who inhabit the Lower Aruka, acknowledge a Warran by the name of William as their chieftain, who resides at the small brook Atopani.

We followed Mr. King to the Warran settlement Cumaka, which is within a short distance of Atopani, and landed there in the evening. We found a large assemblage of Warrans, with their chieftain William. The Indians were suffering, to an extent painful to behold, from ophthalmia. My previous excursions have made me acquainted with various tribes who inhabit British Guiana or the adjacent territories; but though that disease is by no means unusual among them, I nowhere saw it so frightfully exhibited as here, where at least 50 per cent. of the inhabitants are labouring under it, or have had their eyesight impaired by it. I ascribe it to their inhabiting the low marshy grounds, where it appears they are more subject to colds than in the open savannahs or on the high mountains, and to carelessness.

Cumaka is situated on rising ground. These hillocks, which are the first high ground from the sea inland, form a small chain that extends in a western direction: they are composed of indurated clay, highly ochreous; and, to judge from their vegetation, and the provision-grounds of the Indians on their declivities, the soil is fertile. It is only here that the vegetation of the banks on the river begins to change. Hitherto it consisted of curida and mangrove trees, and numerous manicole palms; but when we had reached the rising ground, we observed noble forest-trees—as, for example, the crab-nut tree, useful for building material; locust, curaliara, siruaballia, soriari, and others. From the curaliara the Warrans prepare canoes and corials; and from the size of these I judge of the height of the trees from which they are made.

I resolved, as soon as the general health of my crew was restored, to proceed to the mouth of the Barima for the purpose of examining that part of the river. I engaged six Warran Indians, under the command of the chieftain's son, to accompany us, and we set out on our journey on the 10th of May; and having paddled through the greater part of the night, we landed the following day at the mouth of the Barima, where we encamped not far from Point Barima, on the right bank of the river.

The survey of the Barima was finished by the 19th of May. Its

banks are marshy to its junction with the Aruka; and so much subjected to the tide, that we could not find any spot fit for our night-quarters. It would cost the same labour and expense to bring the lower tracts into cultivation that were required to render the coast land of Demerara arable and productive. Of the upper regions, which I have not yet visited, I can say nothing.

The fish known under the name of querrunai in the colony abounds in these estuaries, and its value is acknowledged, as one in its dry state brings in the market of Georgetown from five to six *bits* (1*s*. 9*d*. to 2*s*. 3*d*.). Of equal, if not greater value, is the morocotto, which frequents the rivers that fall into the Orinoco, and weighs when taken from 10 to 12 lbs. I consider it of importance to point out every resource that the country possesses. These fisheries, if followed up in a proper manner, would no doubt become a useful branch of internal commerce.

We left the mouth of the river Barima on the 20th of May, and arrived at Cumaka, which we had selected as our depôt, on the following day.

Thirteen miles from Cumaka, in a southern direction, the Aruka is joined by the Aruau, by means of which the portage is reached which forms the communication between the rivers Aruka and Amacura. I resolved, however, to follow the Aruka some distance beyond the junction, in order to visit a Warran settlement, and to become acquainted with the character of the upper course of that river. It decreases materially in size, being scarcely more than thirty yards across; its banks, still swampy, are studded with manicole and truti palms, along the stems of which we saw the aromatic vanilla trailing in large quantities, forming natural festoons, and its numerous white flowers diffusing a delicious perfume. The water of the river was of a jet-black, and so clear, that it was difficult to detect where the reflected image, which the trees and shrubs bordering its banks cast into the river, separated from the real object.

We returned next morning to the junction of the Aruau with the Aruka, and, following the former river upwards, reached in the evening the portage, whence we had to transport the corial to one of the rivulets which flow into the Amacura.

The soil consisted of rich loam; and I observed several trees useful for naval and civil architecture, as the crab-wood, siruadallia, soriari, mora, and many others. One of the mora-trees astonished me by its gigantic size.

The botanist would have been here much delighted by a diversified and interesting flora. Orchideous plants, the *Peristeria* (or flower of the Holy Spirit); several *Epidendra*, with scarlet blossoms; and many others of equal interest, adorned the trees. A *Crucian* with white flowers and a delicious perfume bordered the banks; *Bignoniaceæ* trailed along the trees; and the *Brownea racemosa*, which has been compared to our rose, added to the variety by its bright scarlet colour, especially when contrasted with the green of the surrounding shrubs and trees.

We ascended it, in order to pay a visit to Assecura, a settlement

of Arawaaks and Warrans, under the Arawaak chieftain Jan. We were received in a very friendly manner; and found in him an intelligent man, who spoke the Creol-Dutch perfectly. The settlement consisted mostly of Arawaaks, and only a few Warrans. The greater cleanliness in person of the former, compared with the latter, was striking. We did not observe among any of the Arawaaks (whether children or adults) those tumours which are caused by an accumulation of chigoes, and which, being neglected to be extracted in time, render many of the Warran children lame; indeed, as the chigoes penetrate other parts as well as the feet, these poor children not only suffer the greatest pain by the neglect of their parents, but are rendered in their appearance positively offensive. This was not the case with the Arawaaks, among whom the filthy state of the Warrans is proverbial; nor did they suffer from those ophthalmic complaints, which I have mentioned as being so common to the Warrans of these rivers, and of which the extent has been under-rated in the statements that even fifty per cent. of them suffer under it.

With Captain Jan of Assecura as a guide, and our crew increased by several of his followers, we left the settlement on the 2nd of June, and now ascended the Amacura.

The next day (June 3rd) proved so rainy that we were obliged to remain stationary. We started, however, on the 4th of June, to continue the survey of the Amacura to its falls or rapids, which are caused by a ledge of granitic rocks that cross the river and impede its farther navigation.

As we advanced I found its banks increase in height, and become studded with noble forest-trees. The gorgeous flowers of the *Brownea racemosa* and *Gustavia angustifolia* were so abundant that they added considerably to the beauty of the sylvan scenery.

We left on the 7th of June, on our farther descent to the mouth of Amacura. The Arawaak, Captain Jan, who went with us to the Upper Amacura, and who proved himself very useful and intelligent, accompanied us farther, as his knowledge of the localities, and the names of streams which fall into the Amacura, rendered his services valuable. The streams which join the river from its eastern or right bank are very numerous; and it increases materially in breadth: I state its average depth at its lower course as eighteen feet, though there are places which much exceed that depth. A peculiar feature in this river are large patches, consisting of matted grass, the splendid blue water-lily (*Ponthederia azurea*), and several other water-plants, which, torn off by the increased stream during the rainy season, come floating down with the current, and reaching that part of the river where it is subjected to the tides, are carried to and fro, as the tide may be flowing or falling. We might have numbered thousands of these little floating islands. We reached, in the afternoon at three o'clock, the Coyuni, which, like the Mora from the Waini to the Barima, and *vice versâ*, offers an uninterrupted passage in canoes from the Amacura to the Araturi. The Coyuni connects the Amacura with the Waicaicaru or Bassama, which falls into the Araturi.

This river flows, opposite the island Smataca, into the Orinoco, and is another instance of a remarkable connexion between the tidal rivers of this coast.

There is no doubt that the Amacura is navigable for smaller vessels and steamers to the Yarikita; the bar at its mouth, and the inconsiderable breadth, which seldom amounts to more than 300 yards, render it unfit for larger vessels. It abounds in that delicious fish morocotto.

It was late in the evening before we reached the mouth of the Amacura. We arrived on the 10th of June at Cumaka, where, to my great satisfaction, I found the invalids mostly restored, and Mr. Superintendent King rejoicing in his recovered eyesight.

Although the rainy season has for some time past set in, and although our stores are materially reduced, and we have been deprived of many comforts, I yet deem it my duty to persevere, and continue the survey to the Cuyuni.

Demerara, August 1841.

The party under my command left Cumaka, where we had sojourned for some time, on the 15th of June, and having arrived at the junction of the Aruka with the Barima, we continued the ascent of the latter river in an east-south-eastern direction : we reached, next day, its junction with the Kaituma, which falls in on the left bank from the S., and is at its mouth about 200 feet wide. The Kaituma is inhabited by Warran and Waika Indians, and is connected with the Upper Barima by several intermediate brooks.

Numerous rivulets join the Barima on both its banks; some of them inhabited by Warrans. It has still, however, the appearance of a tidal river, being margined by mangrove and curida bushes, over which manicole and truli palms raise their heads. Its banks form continued swamps, which only can be made arable through the industry of man.

I always considered it my duty, wherever an opportunity offered, to observe how far the geological structure of the country might be favourable to cultivation ; it being undeniable that the quality of the soil depends generally upon the rocks which form the strata below the arable land. The superstrata at the hills of Warina consist of ochreous clay, intermixed with mould, pebbles, and that due proportion of sand which would particularly qualify it for the cultivation of coffee. The large blocks of ferruginous clay which lie dispersed on the surface ensure the necessary moisture for the cultivation of that plant; for it is well known to the agriculturists how beneficially such blocks operate on the soil on which they lie, contributing not only to the retention of moisture, which would otherwise evaporate, but to the precipitation of atmospheric vapours.

Since we had left Warina, our course up the Barima lay more to the S.W.: the banks of the rivers became higher ; while the palms and mangrove bushes, which till now had been so numerous, became less frequent, and were replaced by a more varied vegetation. Our Indian guides informed us that, by ascending the rivulet Yarumuku

half a day, we should reach high hills and savannahs. We continued, however, the ascent of the Barima, and passed the rivulets Aruta and Pegua; the latter inhabited by Warrans.

In lieu of palms, the most stately mora-trees overshadowed the river. In all my former travels in Guiana I have nowhere seen trees of this description so gigantic as on the land adjoining the Barima at its upper course. Indeed, frequently, when our boat rounded some point which the river made in its course, and a long reach was before us, these majestic trees appeared in the background as hillocks clothed with vegetation, until a nearer approach showed our mistake; and we found that what we considered to have been a hillock was a single tree, rising to the enormous height of 130 to 150 feet; forming by itself, as it were, a forest of vegetation. The importance of the mora in naval architecture is now fully recognised in Great Britain, and a new export trade has been opened to the colony. On the Upper Barima this tree is so abundant, and grows to such a size, that the whole British navy might be reconstructed merely from the trees which line its banks; a circumstance well worth consideration, for the river being navigable to vessels of twelve feet draught, the craft intended for the transport of the timber might load at the very spot where the trees are cut down. It is only lately that the timber of Guiana has come into notice in England; but so superior is the mora and the green-heart for objects of naval architecture, that a higher price is given for them in seaport towns than for any other wood imported into England.

I was anxious to examine the Barima beyond its falls. I started accordingly, on the 24th of June, in a small canoe, accompanied by Mr. Glascott, the assistant-surveyor, and Mr. Echlin, the artist of the expedition. Descending the Manari for a short distance, we reached the Barima by two of those natural canals (the Gaima and Ataima) which so frequently connect rivers having a parallel course in these swampy regions. The almost continual torrents of rain had caused the Barima to overflow its banks, and we found the current running at the rate of from four to four and a half miles an hour. Our progress was consequently slow. A short distance above the off-flow which connects the Barima and Manari, we visited a Warran settlement called Emu, where we admired a gigantic bamboo, several hundred yards in circumference.

We found two of the Indians finishing a native canoe, which they had cut out of cedar (*Icica altissima*), a species of wood uncommonly well qualified for that purpose, and resembling, in its durability, odour, and reddish colour, the famed Bermuda cedar, although a genus quite distinct from the icica. As the cedar-tree of Guiana is by no means scarce, it deserves more attention.

We were accompanied by a number of Indians from Simuita and the neighbouring settlements, who intended to ascend the river to the falls, to shoot the delicious fish called maracotto, or ossibu, which, at the time these waters are full, migrate beyond the falls for the purpose of depositing their spawn. We formed a flotilla of boats, our canoe being the leading frigate. Several fish were procured on

the first day. In order to attract them to the shore, a number of the seeds of the carapa, or crab-nut, are pounded, and having been inclosed in a netting of withes, they are put in the water, and soon attract the greedy maracotto. An Indian stands ready with a light spear, which he lances into them, one after another, with unerring aim. The maracotto frequently attains a length of thirty inches, and is twenty-six inches in girth. Its flavour is delicious.

I now found it advisable to discontinue the ascent in corials, for numerous trees which had fallen across the Barima obstructed the boats. Leaving Mr. Glascott in charge of the camp formed at the junction of the two rivers, and having armed the most effective of the crew with cutlasses and axes, we cut our way through entangled bushes and swamps, following the left bank of the Barima. With the exception of two rivulets, we found the tributaries which the river received of inconsiderable size. Its bed is frequently traversed by granitic dikes, over which the water precipitated itself impetuously; and its current was so rapid that it would have been difficult to make any way in ascending, even in a small corial.

I admired the number of noble forest-trees, among which I observed the bullet-tree, the locust-tree, the crab-wood, curahara, itapu, cuyama, yarura, and its allied species, parnacussana; the suari or impa, and makaratalli. But the most remarkable appeared to me the tunkara, which measured in circumference from twenty-eight to thirty feet. Its trunk rose free from branches, smooth and round, to about seventy or eighty feet; and I was told by some of my Indian guides that the Warrans used the tree for making canoes. It is soft and white, and the colonists prepare staves from it. The Warrans make their bark or shell canoes of the bark of the bullet-tree and makaratalli.

We were joined by a number of Warrans and several Waikas from Manari, whose services we had engaged to assist in carrying our luggage from Manari to the Barama, which flows into the Waini. We were told that we should have to ascend the Barama in boats for four days before we could reach the path that leads to the Cuyuni.

An Indian carries scarcely more than 24 lbs. weight on journeys overland. While the negro carries invariably his burthen on his head, experience has taught the Indian that by doing so he would not be able to make much progress through the thick woods, and his load is therefore slung on his back; for that purpose they have baskets which are made of the stems of a calathia, or of some species of palm.

Our preparations had been completed, the loads distributed according to the appearance of strength possessed by our carriers; and after Mr. Glascott had left with his party, in a boat which was hired for the purpose, we commenced our march overland on the 8th of July. The forest through which we now proceeded appeared to have less underwood; and I observed numerous specimens of that valuable tree the siruaballia, which affords one of the best timbers for the planking of vessels and the construction of gigs, boats,

&c. I saw trees of this description, of which the trunks might have measured seventy feet before they branched off.

The cedar and other forest trees, many of them of the most gigantic dimensions, were seen in great numbers during the course of this day's journey, besides numerous hya-hya trees. The hya-hya is the remarkable tree which yields by incision a milky fluid that forms a good substitute for cow's milk. The Indian, to whom it is inexplicable how man can make use of milk after having been weaned from the maternal breast, does not attach any value to this fluid as an article of food, but the younger community prepare from it balls of caoutchouc.

Our path led over hillocks from fifty to sixty feet high, extending in longitudinal ridges: their intermediate valleys generally formed swamps, on crossing which we frequently sunk to our girths in mud and water. After four hours' march we crossed the Caruawa, here a mere rivulet; and arrived in the afternoon at a small settlement consisting of two houses inhabited by Waikas.

The neatness and order of the provision-fields around these settlements showed that the Indian who presided over them was distinguished from the generality of his brethren. Paths led through the fields; the yams were trailed against poles; lime and orange trees, so seldom to be met with amongst the Indians, increased the favourable idea I had of the inhabitants. We found only one Indian and some females at home; the rest, with their chieftain, were gone to work for a time at a wood-cutting establishment on the river Pomeroon with a view to earn money to procure those articles which have become almost necessaries of life with them, namely, wearing apparel, implements for cultivating their fields, guns, powder and shot.

Leaving Paripu we continued our march; and in the afternoon of the same day arrived at another large settlement, judging at least from the number of the huts. Here also the male inhabitants were absent, having gone to work at the Pomeroon.

We departed from Cariacu on the 11th of July. The Barama resembles much the Upper Barima; its banks are clothed with a similar vegetation, and it is equally serpentine in its course. I noticed a good deal of potter's clay, used by the Caribisi for the manufacture of pottery, which for its durability is highly esteemed by the colonists. This clay has a grayish colour, and is mixed with the loose materials of decomposing granite.

The rivulet Nakuwai was the largest tributary which we passed in the course of our first day's ascent; it joins the Barama on its left bank. We noticed the first rocks lying in the river's bed above the rivulet Abocotté. About a mile and a half above this, the Erawanta and Mazuwini join the Barama close to each other. During the rainy season, when the bed of the river is full, it forms numerous off-flows, which adopt a more direct course than the river itself, and join it again at some distance. The Indians who are acquainted with these branches navigate them, and thus shorten the ascent materially.

We passed, on the afternoon of the 13th of July, some hillocks, and, soon after, the first rapid, formed by dikes of granite; and reached a settlement of Waikas, called Cadui, which we were told was the last inhabited place below the great fall. We were here struck with an air of plenty: the cassava grounds were extensive; yams, sweet potatoes, plantains, and bananas were abundant; also the paripi palm, and papayas, of which the fruit resembled a large melon, some of them measuring twenty-eight inches in circumference. Sugar-cane, cashew, and cotton-trees grew around the huts. A number of wild fowls was observed; moridies, powies, parrots of all plumage; several sun-birds, all tame, and associating amicably with one another.

I succeeded in procuring a set of circum-meridian altitudes, according to which the settlement was in 7° 19′ N. latitude. We heard quite distinctly during night the roaring of the great fall Dowocaima, which is about two miles distant, and bears S. 58° W.

Having engaged three more Indians to accompany us from Cadui to the Cuyuni, we started next morning at an early hour; and after passing some rapids, approached the great fall. We had to unload near the island Wayaruima, and carry the canoes and luggage two miles overland.

These cataracts surpass in grandeur the great falls of the river Demerara, to which in their structure they bear some resemblance. The whole fall on the Barama amounts to about 120 feet in a distance of two miles; but, from the sinuosities of the channel, there is no one point which affords a *coup-d'œil.*

The grandest scene is offered by the three upper falls, where the river, narrowing into about eighty feet, rushes turbulently down the precipice in three jets, and forms, in the distance of about 100 yards, a fall of thirty-five to forty feet perpendicular. This part is called Dowocaima, and as we saw it at the height of the rainy season, when the river is full to overflowing, the scene is sublime indeed. The banks were bordered by a primitive forest, and foliage of every hue, among which the bright red of the young mora-leaves formed a striking object. Lianes, reaching from boughs sixty feet high down to the water's edge; a thousand creepers, so closely enveloping whole rows of trees as to give them a fanciful resemblance to old massy columns crowned with ivy; white festoons and clusters of purple and yellow salver-shaped flowers trailing from tree to tree; all combined to form a vivid picture of tropical vegetation. The uproar of the masses of water which rush over the ledges of rock, and envelope in foam the surrounding scenery, added to the characteristic features of the landscape.

The ledges of rock are composed of gneiss, their stratification being S. 33° W.; they form an impediment to all further navigation, and are such as, if a denser population should render the step necessary, could only be overcome by canals or railroads. In the absence of these, our Indians took their light bark canoes on their heads, and carried them to that part of the river where there were no serious obstacles to its further navigation.

We passed next day the rapid Massiwinidui, and several others of less consequence, and encamped in the evening at the foot of the fall Aunama, from whence the path leads to the Cuyuni. The river Aunama joins the Barama just below the fall.

Our course on the 17th of July continued W.S.W. We crossed, at ten o'olock in the morning, the Aunama for the last time; and having passed a ridge of small hills which stretched S. by W., we stood soon after on the western branch of the rivulet Acarabisi. We had now reached the most elevated spot between the Cuyuni and Barama, and entered another system of rivers, the waters of which, instead of flowing northwards to the Waini and Barama, run to the S.; and, uniting with the Cuyuni, are conveyed to the Atlantic by the Essequibo.

From this ridge of hills the ground slopes southward to the banks of the Cuyuni; and I estimated the highest ridge which separates the two systems at 520 feet above the level of the sea. Heights which really deserve the name of mountains commence twenty miles further westward. The Aunama and Acarabisi are only divided from each other by hillocks which rise not more than from sixty to 100 feet above their level. Both rivers, if properly cleared of trees which have fallen across, would be navigable for canoes and punts; and as the portage is not more than two miles, these rivers present the means of connecting the Pomeroon and Morocco coast with the Upper Cuyuni, where the channel of that river is comparatively unobstructed.

We followed the valley of the Acarabisi, by no means a comfortable path, as at this season of the year it formed an almost continued swamp, and we fell sometimes to our girths in the mud. A rich retentive soil renders these regions peculiarly fit for the cultivation of rice. It rained almost incessantly, and we were truly rejoiced when, on the morning of the 19th of July, we arrived at the Caribisi settlement Haiowa, about two miles distant from the left bank of the Cuyuni. The country between the Barama and the Cuyuni is a series of narrow valleys, situated between hillocks of no great height. The principal valleys are those which are drained by the rivers Aunama and Acarabisi. The general direction of the others is at an oblique angle to these, and they vary considerably in extent. Sometimes they are merely defiles, and the greater number of them do not expand more than about a quarter of a mile. I am fully persuaded that there can be no soil better qualified for the cultivation of coffee than what is found here. The zones of granite, sometimes in spherical blocks, and the vitrified and ferruginous masses of clay which I frequently observed traversing the mountains, are favourable to the cultivation of that plant.

The productiveness of the soil nearer to the banks of the Cuyuni is evident from the specimens of sugar-cane, cotton, and plantains which were brought to me while at Haiowa. I saw a cane measuring 15 feet long, and $7\frac{1}{2}$ inches in circumference. The cotton, too, was of excellent quality and staple; and the few tobacco-plants

which the Indians raised for their own use were remarkable for their large leaves, and, as I was assured, for their fine flavour.

We expected to meet here a party which was to have been sent with a supply of provisions up the Cuyuni, for our stores had long since been given out, and we were reduced to cassava bread and what game chance brought to our hands. We were, however, disappointed in our expectations; and, in the absence of any craft, I had to send my coxswain a journey of two days higher up the Cuyuni, where I was told there was a corial large enough for our use. He arrived, and having bargained for the corial, returned, with some additional guides, on the morning of the 22nd of July. We embarked our baggage, and a few hours later began the descent of the Cuyuni.

The Cuyuni presented, where we embarked, a magnificent sheet of water. I estimated its width at from 400 to 500 yards. Its current was rapid, perhaps $3\frac{1}{2}$ miles in an hour, and its bed full to overflowing. A small chain of hills, called Macapa, bore nearly W. They are distant about a mile.

Our progress was rapid, and in the afternoon we had safely passed the dangerous fall of Kanaima, and rested at an abandoned settlement on the river's right bank. There were some other settlements in the neighbourhood, the inhabitants of which came to visit us. We did not observe any mora-trees along the banks; they were replaced by another equally majestic tree which the Indians called Tá-au. The islands with which the river was studded were almost covered with bushes of the *Quassia amara* or bitter-ash. The stream itself continued as if cut up by a multitude of large channels, which are not seen from each other, thickly-wooded islands intervening; and no accurate idea can be formed of their total breadth: sometimes a little range of densely-wooded hillocks approached the water's edge.

We passed the Otomong hills, and avoided by narrow passages between islands numerous large cataracts, which in our small canoes it would have been dangerous to attempt to descend. At the cataract of Poinka-marka, or Womuipong of the Caribisi, we had to unload and draw the canoes over a portage of about 300 yards' extent. The perpendicular fall of this cataract is not less than thirty feet, and it is generally called the *Canoe-Wrecker*, in consequence of many fatal accidents which have occurred here.

The rapids and falls now became less frequent, and still-water commenced. The tract of granite and gneiss which causes these impediments extends therefore from the Arakuna hills, uninterrupted, to the small range of hillocks called Macapa. It is about fifty to sixty miles in length, and constitutes the second large series of falls.

We had anxiously looked forward to meet the party which we expected with supplies of provisions. We heard of them today at a settlement opposite the Toro hills, but only to have the disappointment of learning, that on ascending the previous day the dangerous fall Wakupang, they had lost everything, and saved only their lives and the corial. Among the luggage lost was one of the instruments,

Massey's log, and a new tarpauling. Thus disappointed in our hopes of meeting comfort, we had to put up for some days longer with our scanty fare. We paid off our guides who had accompanied us from Haiowa, as, with the men who had come up from the Essequibo, our crew was sufficiently strong to reach that river.

The dangerous fall Wakupang, where our stores were lost on the preceding day, was passed without accident. This is the commencement of the second series of rapids or falls. The river is studded with islands; green-heart and purple-heart, both most valuable trees, become abundant along its banks; but the impediments which the numerous rapids throw in the way will for some time render these treasures unavailable.

We passed in the afternoon the Cutuau hills, along which a river of the same name has its course. The Cutuau offers a communication with the river Waini, and is much frequented by the Indians of both rivers; eight miles further eastward is the rivulet Wayarimpo, whence another path leads to the Paruni.

We reached on that evening Ematuba, generally called "the Great Fall," where we had to unload and haul our corials over land, and encamped at the foot of the small island whither the corials had been drawn. Continued rains precluded the possibility of any observations, and we started on the morning of July 27th, under the same unfavourable weather. An hour and a half after, we were at the foot of the last fall, called Akayu, and saw before us the junction of the three rivers, Essequibo, Mazaruni, and Cuyuni.

Our party left Bartika Grove on the 28th of July in two corials, and we arrived safely in George-town on the second day ensuing, after an absence of three months and a half, during which period we had travelled upwards of 700 miles; and although that period presented but a continuation of the most unfavourable weather, we nevertheless determined *twenty-one* points astronomically, and acquired a correct knowledge of the course of the rivers Waini, Barima, Amacura, Barama, and Cuyuni, all of which had never been visited before by any person competent to delineate them in a map; no wonder therefore that their actual course should be almost opposite to what it is represented in extant maps.

The fertility of the tract we have explored has been pointed out in various places in this as well as my former account. The lands adjacent to the rivers Amacura, Barima, and Barama, and beyond the reach of the tides, are superior in quality to those of any other district hitherto visited; and this refers equally to the Cuyuni, where I met sugar-canes of the finest description, and native cottons of superior staple and quality. But the impediments to the navigation of the Cuyuni will, I fear, prove a great obstacle in the way of rendering the fertility of its banks available. The Amacura, Barima, and Waini are for a great distance free from such impediments, and a denser population only is wanted to render this part of Guiana one of the most productive throughout its whole extent; and to this end the numerous natural canals and connexions between its chief rivers would materially contribute.

These tracts are at present inhabited by the following tribes:—1. Warrans, along the coast, from Pomeroon to the Amacura; 2. Arawaaks, intermixed with the former, chiefly at the rivers Waini, Barima, and Amacura; 3. Waikas and Chaymas, sister tribes of the Wacawais, at the upper course of these rivers, and the regions between the Barama and Cuyuni. I estimate the whole number of these nations at 2500. Many of them assist in felling timber or in working on the estates; and if the system which only of late years has been followed, namely, that of treating the Indian as a rational being, in giving him a fair remuneration for his work, shall be generally adopted, the aborigines, there is no doubt, will prove most useful labourers to the colony. It is my full persuasion, that if the attention and paternal provisions which the aborigines of Guiana have of late years enjoyed at the hands of Her Majesty's Government be continued, and means adopted to afford them religious instruction, a relic of the once numerous Indian population may yet be rescued.

BIBLIOGRAPHICAL NOTICES.

Die Pflanze im Momente der Thierwerdung. Beobachtet von Dr. F. Unger. Wien, 1843, pp. 100, with a large quarto plate.

The observations which Dr. Unger made many years since on the peculiar motion of the spores of *Vaucheria clavata*, though questioned by many, have for the most part been received as correct and well-founded. Indeed they have been confirmed more or less by Treviranus, Meyen, Trentepohl, Valentin and others, and the fact is undoubtedly one of the most curious amongst those which have been recorded of apparently spontaneous motion amongst the reproductive organs of Algæ. No one seems hitherto to have ascertained how this motion is produced, with the exception of Dr. Unger, who in the treatise before us has fully described the structure of the cuticle of the spores, which it appears is clothed with short vibratory processes, exactly as in many of the inferior animals, or particular organs or membranes of those of a higher grade. The fact of the existence of such processes in vegetables is not, however, perhaps altogether new to science. Pouchet has described something of the kind in the larger circulating globules in *Zannichellia*, though so imperfectly that the real nature of the processes is not very evident.

We now proceed to give the results of Unger's observations as detailed by himself at the end of his treatise, which we think cannot fail to interest our readers.

1. *Vaucheria clavata*, Ag. (*Ectosperma clavata*, Vauch.) is, considered respectively of all its peculiarities, a plant, which by the union of numerous individuals forms small tufts on the surface of stones in running streams, in the middle of Europe. It consists, when fully developed, of a branched inarticulate tube, 0037th of a Vienna inch in diameter, which continues to grow above, while the lower portions are dead or decomposed, and in this state lives from the end of winter

through spring, summer, autumn and winter till the approach of the new spring.

2. The tube consists of a tender vegetable membrane, whose inner surface is clothed, more or less thickly, with round or elongated particles of hardened jelly involved in chlorophyll, whence the whole plant derives its lively green colour. The rest of the tube is filled with a fluid, somewhat granular, slimy substance, in which, as also in the globules of the chlorophyll, there is no observable motion.

3. Under the due influence of light and temperature a peculiar alteration takes place at the top of the tube and of its branches, which has the closest agreement with the formation of spores in simply constructed plants. There originates—namely, below the tips of the shoots—a transverse dissepiment in the tube, which was at first perfectly continuous. This is very thin, and separates the upper portion of the contents of the tips of the threads from that portion which is below. In this upper part only a new tube is formed out of a colourless, slimy, granular substance within the mother-tube, which is closely pressed to it.

4. The development of this inclosed tube resembles that of other spores in their mother-cells, but it at length attains a higher order of organization*, inasmuch as, instead of being formed of a simple vegetable membrane, it is, in fact, an epithelium with vibrating ciliary processes. At present, however, there is scarcely a trace of organization in the tube itself or its contents.

5. By means of the swelling of the ripe spore simultaneously with the attenuation of the mother-tube, the tube bursts and the spore pushes spontaneously through the narrow aperture, exhibiting at last a revolving motion. This process, which lasts some minutes, may in a certain degree be compared with that of delivery in the animal kingdom.

6. After the separation of the spores the dissepiment expands, and forms a sac within the vacant tube, or a branch is given off immediately below the dissepiment. In either case we have a mere prolongation of the original tube.

7. The same process of formation takes place in the new portion of the original tube, and it is repeated a third time; but as the tube is continually decreasing in diameter, the new spore is proportionally less†.

8. The spore is an oval or elliptic body, which, when liberated from the mother-tube, moves freely in water in every direction and swims about like an animal. An epithelium uniformly clothed with vibrating cilia incloses a slimy substance, which in part assumes the form of vesicular cavities; the epithelium is clothed within with numerous globules which are invested with chlorophyll. At the

* We follow the language of Unger, without however adopting his views altogether as to the animal nature of the spores. See however on this head 'Berk. Gleanings of Brit. Algæ,' under the article *Vaucheria clavata*.—Ed.

† This is perhaps one of the most interesting facts contained in the treatise, and altogether analogous with what Corda describes in the formation of the spores of certain Fungi.—Ed.

lighter anterior portion these green globules are much less frequent than in the posterior portion; so, on the contrary, the vesicular cavities are more numerous in the anterior portion than behind, where they are replaced by globules of chlorophyll. There is no trace of a cytoblast.

9. The motions of the spores are rotatory round their axis major from left to right, and sometimes straightforward; in either case produced by the vibrating cilia. Moments of rest alternate at pleasure with motion, which on the whole continues for about two hours.

10. With the cessation of motion the ellipsoid assumes a globular form; the colour becomes uniform, and the crystalline transparent epithelium changes into a tender, homogeneous, vegetable membrane. In less than twelve hours the bladder elongates at one or two points, which is the indication of germination.

11. The development of the tube proceeds rapidly. On one side a root is formed, by which the plant is fastened, while on the other side the spore elongates, becomes branched, and within fourteen days produces new spores.

12. I do not find any substance which tends to prolong the animal life of these germs. Experiments show that it is very easily destroyed by the weakest dynamic and chemical external influences, and that even the vegetable life is destroyed by them. A temperature from 0° R. to 15° R. is proper to it. A higher temperature is destructive.

Light has no influence in prolonging or shortening the animal life. On the contrary, absolute darkness retards the process of germination, while green light promotes it. Acids, alkalies, salts in the smallest proportions, are destructive; narcotics destroy both the power of motion and germination. A weak electrical stream deranges the motion, a strong one is altogether fatal.

13. The spontaneous motion of the germs of *Vaucheria* is not an isolated fact. A whole series of Algæ (*Zoospermeæ*), as well articulate as inarticulate, have this peculiarity, and it appears from the present observations that the same organization is the cause of the phænomena. Comparative inquiries show that these moveable germs are to be regarded as embryos, which resemble the tetraspores of Algæ*.

14. These germs, regarded on one side only, are not to be excluded from the animal kingdom to which they belong, as indicated by the structure of the skin, the voluntary motion, and their sensibility to outward influence.

15. Neither the absence of mouth or reproductive organs, nor the presence of gum (schleim) and chlorophyll, are contradictory as to their animal nature, since there are animals which do not possess the first, and possessed of parts which otherwise belong to vegetables. Among animal forms the embryos of the lower classes of invertebrate

* The word in the original is *Fucoideen*; but this is evidently a slip of the pen. It should be *Florideen*.—Ed.

animals resemble them most, and indeed, at present, are not distinguishable by any acute characters.

16. We conclude also that the germs of *Vaucheria* and the allied Algæ are animal embryos which cannot raise themselves above this embryonic condition, and after a short existence resume the vegetable nature to which they owed their origin.

Note.—In the number of 'Annales des Sciences Naturelles' for May 1843, M. Thuret has published an interesting memoir on the movement of the spores of Algæ, and has gone over the same ground with Unger, arriving at similar results. He is convinced that a great number of reputed species of *Vaucheria* are mere varieties. There is, however, a portion of his memoir, on a point simply indicated by Unger, which demands the greatest attention, viz. that relative to the motion and structure of the granules contained in the articulations of *Confervæ*, *Chætophora*, &c. In *Conferva* and *Chætophora* he finds the granules furnished at the narrower end with two, or at most three, flagelliform, extremely slender appendages, on which their motion appears to depend, while in *Prolifera* (= *Vesiculifera*, Hassall) there is a circle of appendages. The granules of *Conferva* differ therefore very little from the granules of the red snow, which, if M. Thuret's observations be confirmed, may after all be a vegetable. At least, if it be not so considered, it will be very difficult to deny the animality of the spores of *Conferva*.

Recherches sur la Rubéfaction des Eaux et leur Oxygenation par les Animalcules et les Algues. Par Aug. et Ch. Morren : Bruxelles, 4to, pp. 130. pl. 7.

This work, which has been kindly communicated by the authors, consists of a series of memoirs, of which the first relates to the oxygenation of water by means of Algæ and Infusoria, and the remainder to its rubefaction and the description of various species by which the change in colour is effected. It is the result of observations made by two relations, Augustus and Charles Morren, of whom the former is Proviseur of the Royal College of Angers and a celebrated chemist, the latter Professor of Botany in the University of Liège and an accomplished zoologist.

There is a singular difference in the quantity of air which exists at different times in running and stagnant water, as also in the quantity of oxygen comprised in this air at different hours of the day. The proportion of oxygen varies from 25 to 48 or 61 per cent. from sunrise to 5 o'clock in the afternoon. The subject is obviously of great importance as regards health and in many other points of view, and it is to the consideration of it that the authors have applied themselves in the first memoir. The cause of these differences is found in the influence of light on the respiration of the Infusoria and Algæ which are contained in the water.

The influence of oxygen is very great on the salutary quality of this universal beverage; on the degree of its action on the nutrition of vegetables, and consequently when used for irrigation; nor is it less active as regards the art of bleaching and dyeing. It is easy, from what has been said, to perceive the great importance of the subject, and it is difficult to imagine to what results it may finally lead. In a philosophical point of view we may remark, that it ex-

plains why the Creator has multiplied in such a marvellous degree the animalcules and microscopic plants with which water abounds. Though regarded frequently as objects of disgust and forerunners of disease, they are, in fact, necessary to the general harmony of nature. It is to them we are indebted for the salubrity of waters which would otherwise be injurious*.

We proceed to state the circumstances which led to these investigations, as our readers will easily understand from them the nature of the observations. M. Augustus Morren had analysed the water of a great number of wells and fountains at Angers, and examined the gases which it is capable of containing. He then experimented on that of some neighbouring ponds, and he found that, habitually impregnated with a large quantity of vegetable and animal substances, it held in dissolution, notwithstanding the contact of a perpetually-renewed atmosphere, a gas frequently less rich in oxygen than the water of the two rivers, Maine and Loire, which run near Angers, and even than the water of the wells and fountains of the country.

After the admirable work of Humboldt and Guy-Lussac on Eudiometry, we know that in its normal state the running water of rivers, or distilled water, well aërated, holds in dissolution about a 25th part of its volume of oxygen and azote, in the proportion of 32 of oxygen to 68 of azote. He was then greatly surprised, when, on a fine day in the month of July, having analysed the air extracted by ebullition from the water of a fish-pond, he found that it contained 56 to 58 per cent. of oxygen. This water had a green tint. He repeated the experiment, filtering it carefully to get it free from the colouring matter, but the analysis gave him the same result. The next day he analysed again the air derived from the water of the same pond, taken at different times of the day. In the morning it contained only 25 per cent. of oxygen, towards midday 48 per cent., and at 5 in the afternoon 61 per cent., which was the greatest proportion he ever met with. The volume of air contained was variable, and increased perceptibly with the quantity of oxygen. The quantity of azote remained constant, but the carbonic acid contained in the water varied.

These experiments convinced him that the solar light has an important part in these phænomena, but that it is not the only cause of them. Cold rainy weather succeeded, and the proportion of oxygen was frequently less than 28 per cent. With the return of fine weather the proportion did not exceed 34; but he found that the green colour of the water had disappeared. In the middle of August the water again became green and strongly oxygenated, though in proportion to the light and heat of the sun. The green bodies proved to be *Chlomidomonas pulvisculus*, Ehrenberg.

The oxygenation of water is of course most important for those

* The authors remark, that these relative effects were not even suspected before. This however is scarcely correct. See the remarks of Sir J. E. Smith under *Conf. muralis*, Eng. Bot. tab. 1554.—Ed.

animals which depend upon the proportion contained in it for the purposes of breathing. On three occasions the authors have observed important consequences arise from the extraordinary diminution of the proportion of oxygen, owing to accidental circumstances. At times they have found the proportion so low as 18, 19 or 20 per cent., and the consequence has been the destruction of the greater part of the fish by asphyxia. On the 18th of June 1835, the greater part of the fish in the Maine perished from this cause; and the same circumstance was observed twice in the pond which first directed their attention to the subject of the memoir*.

Their researches into these phænomena led the authors to investigate also the cause of the rubefaction of water, a circumstance which in all ages has excited the attention of the curious, and which has been often regarded as miraculous or ominous. In all cases they have found that it depends on the presence of Infusoria or microscopic Algæ. These researches have given occasion to much interesting discussion regarding the real nature of certain productions which have been referred by authors, according to their peculiar views, to the animal and vegetable kingdom.

Amongst these, the nature of the red snow of the Arctic regions is investigated, and it is satisfactorily proved to be composed of minute animals. The green snow has already been shown by Messrs. Martius and Bravais to be the same thing in a different state. According to them, the granules are red when young, green when old. When seen in perfection the production is evidently animal, and is identical with *Trachelomonas volvocina,* Ehrenberg. It is furnished with a single oral appendage. When dead it endures for a long time without much sensible alteration or decay, and is then exactly like a true *Hæmatococcus.*

It is impossible for us to give an analysis of every chapter, which would extend to a considerable length. We must content ourselves with thus indicating the nature of the work, and recommending it to the notice both of botanists and zoologists, as affording ample matter for reflection.

PROCEEDINGS OF LEARNED SOCIETIES.

LINNÆAN SOCIETY.

April 18, 1843.—The Lord Bishop of Norwich, President, in the Chair.

Read the conclusion of Mr. Griffith's memoir "On the Ovulum of *Santalum, Loranthus, Viscum,*" &c.

In this paper, dated "Malacca, March 28th, 1842," Mr. Griffith proposes to supply many of the deficiencies in his two memoirs on the ovula of *Santalum, Loranthus* and *Viscum,* published in the 18th vol. of the Society's "Transactions," to correct some important mistakes, and to extend his inquiries to another genus of the natural family of *Santalaceæ,* viz. *Osyris.* With this view he gives a detailed

* Perhaps the periodical or occasional mortality of the fish in the Mere at Diss in Norfolk, when the Mere is said to be *sick,* may be ascribed to the same cause.—Ed.

description of the progress of the development of the embryo, so far as he has been enabled to observe it, in *Santalum album, Osyris Nepalensis, Loranthus bicolor, Loranthus globosus* and two species of *Viscum*; each of which subjects is illustrated by an extensive series of microscopical drawings. In connection with these details he proceeds to remark at some length on the four following points:—1. the solidity of the ovarium and the appearance of the ovulum after fecundation, or rather after the action of the pollen on the stigmatic surfaces; 2. the reduction of an ovulum to the nucleus or to the embryonary sac; 3. the embryonary sac; and 4. the origin of the embryo. The following is the summary given by him of his ideas of the structure of *Santalum, Osyris, Loranthus* and *Viscum*:—

"In *Santalum* the ovulum consists of a nucleus and an embryonary sac, prolonged beyond both the apex and base of the nucleus: the albumen and embryo are developed in the parts above the septum [in the exserted portion of the sac], the parts below and the nucleus remaining unchanged. The embryo is developed from the pollinic vesicle. The seed has no actual proper covering, and no other theoretical covering than the incorporated upper separable parts of the embryo-sac.

"In *Osyris* the ovulum is reduced to a nucleus and an embryonary sac, which is prolonged in the same directions as in *Santalum*, but not to such a degree beyond the apex of the nucleus. The seed is formed outside the embryo-sac, and is absolutely without proper tegument, or whatever covering it may have did not enter into the composition of the ovulum. The embryo appears to be developed at some distance from the anterior end of the pollen tube.

"In *Viscum* the modifications appear to me to be two: in the one an evident cavity exists in the ovarium, and the ovulum appears to be reduced to an embryonary sac hanging from one side of the base of a nipple-shaped or conical placenta. In the other the ovulum is reduced to an embryonary sac, but this is erect, and has no such obviously distinct point of origin as in the first. In both the albumen has no other proper covering than the incorporated embryonary sac; and, at least in the last, the embryo appears to be a direct transformation of the pollinic vesicle.

"In *Loranthus* each ovulum appears to be reduced to an embryonary sac, the albumen is developed either partly within the sac, or entirely, or almost entirely, without it. The embryo is a growth from the ends of the continuations of the pollen tubes outside the anterior ends of the embryo-sacs, and is, in one modification, exemplified by *L. globosus*, up to a certain period exterior even to the albumen. In *L. bicolor* the albumen has no proper tegument; in *L. globosus* it may be supposed to have a partial one in the incorporated albuminous part of the embryo-sac.

"The gradation of structure appears to me to be tolerably complete. One modification of *Viscum*, in my opinion, tends to show that in *Santalum* the first steps towards the disappearance of the usual nucleus take place. *Osyris* seems to me to indicate that a similar tendency may affect the embryonary sac; and *Santalum* appears to me to allude to a reduction in the embryo-sac to the form of that of *Osyris*.

Nor is this all, *Osyris* has its albumen and embryo developed outside that end of the sac to which the pollen tubes are applied : *Loranthus bicolor* has the same developed outside the opposite end of the sac. And the partial development of the albumen in the embryo-sac of *Loranthus globosus* may perhaps be a passage to its development outside that sac in *L. bicolor*.

"The novel points of structure and development pointed out in this paper are, so far as I know, the possibility of the separation of a continuous membranous embryo-sac into two distinct parts, of which the lower remains unchanged, though it would almost appear from *Osyris* to be the most permanent; the presence of the embryo-sac not being necessarily connected with its forming one of the constituent parts of the young or of the mature seed; the longitudinal percursion of the embryo-sac by the pollen tubes; the formation of the albumen either only partially within the embryo-sac, or almost entirely, if not quite so, without it; the confluence of the albumina of several sacs into one albumen; the growth of the embryonic tissues from the continuations of the pollen tubes outside the embryo-sac; the possibility of one embryo resulting from a combination of several pollen tubes, and of its becoming interior to the albumen, although it may have been for some time entirely exterior to it.

"I make no mention of the posterior prolongations of the sacs, in doubt of the true nature or origin of the so-called chalazal apparatus of *Thesium*; or of the growth of the embryonic tissues from the ends of the pollen tubes, in doubt of my having misunderstood the observations of M. Schleiden, and in ignorance of those of M. Wydler."

In a subsequent note Mr. Griffith notices certain peculiarities in the development of the embryo in *Avicennia*, and in a genus which, notwithstanding its very curious anomalies, he considers referrible to *Santalales*, and to which he gives the following characters :—

Modeccopsis.

Calyx superus; limbo minutissimo, 5-dentato. *Petala* 5, disco epigyno inserta, basi utrinque uni-glandulosa. *Stamina* 5, petalis opposita. *Ovarium* omninò inferum, 1-loculare. *Ovula* 3, ex apice loculi! pendula, anatropa! *Stylus* brevis. *Stigmata* 3, subcapitata. *Fructus* subdrupaceus, monospermus, calyce demùm soluto quasi 5-valvis!! *Semen* unicum, pendulum; endocarpio osseo inclusum. *Albumen* copiosum. *Radiculæ* locus superus.

Frutex *scandens, cirrhifer, cirrhis axillaribus.* Folia *alterna, exstipulata, oblongo-ovata, basi subcordata et quinque-venia.* Flores *minuti, inconspicui.* Glandulæ *apice piliferæ*! Fructus *abortu solitarius, cum pedicello clavato-pyriformis*; valvæ *intùs rubræ.*

Habitus *Modeccæ*; *Rhamneis* mediante *Gouaniâ* analoga? *Santalaceis* potiùs affinis.

Hab. in Assamiâ Superiore, Oris Tenasserim, Mergui Provinciâ, Malaccâ.

Anniversary Meeting.

May 24.—The Lord Bishop of Norwich, President, in the Chair.

The President opened the business of the Meeting, and having stated the number of Members whom the Society had lost during

the past year, the Secretary read the following notices of some of them :—

The Rev. James Dalton was educated at Clare Hall, in the University of Cambridge, where he took his Bachelor's degree in 1787, and that of Master of Arts in 1790. He was much attached to botanical pursuits, and well acquainted with our native plants, and especially with the *Carices* and *Mosses*. Among the latter he was the first discoverer of several new species, and his name has been commemorated by Sir W. J. Hooker in a well-known genus. Many of his observations are recorded by Sir James E. Smith in his 'English Botany' and 'English Flora.' He became a Fellow of this Society in 1803; and in 1805 he was presented by the King to the living of Croft in Yorkshire, where he continued to reside until his decease, on the 2nd of January in the present year, at the age of 78.

John Latham, M.D., formerly a physician of considerable eminence and extensive practice, was born at Gawsworth in the county of Chester, Dec. 29, 1761, and educated at Brasen-nose College, Oxford, where he took his Doctor's degree in 1788. In the same year he established himself in London, and became successively physician to the Middlesex, the Magdalen, and St. Bartholomew's Hospitals, and Fellow and President of the Royal College of Physicians. He was elected a Fellow of this Society on the 16th of March 1790, and was consequently its senior member. He died on the 20th of April in the present year at Bradwall Hall, Cheshire, to which place he had retired from the fatigues of practice in 1829. His published works are wholly medical.

John Gage Rokewode, Esq., for many years Director of the Society of Antiquaries, was the fourth and youngest son of Sir Thomas Gage of Hengrave Hall in the county of Suffolk, the sixth baronet of that family, and brother of the late Sir Thomas Gage, also a Fellow of our Society and a botanist of considerable attainments, especially in his knowledge of the family of Lichens. On the death of his second brother, he assumed the name of Rokewode and entered into possession of Coldham Hall and the property belonging to it, in pursuance of a settlement executed in 1728 by one of his ancestors. Mr. Gage Rokewode was devoted from an early period of his life to the study of the antiquities of his native country, to the illustration of which his numerous publications in the 'Archæologia,' in the 'Vetusta Monumenta,' and in various separate works, have greatly contributed.

The Society has also to regret the loss of two of its *Associates*.

Mr. Daniel Cooper, whose sudden and melancholy death was noticed in the 'Annals' for January last; and

Mr. Alexander Matthews, an active and intelligent botanical collector, who died at Chachapoyas on the Andes of Peru, on the 24th of November 1841. He had been engaged for many years in forming and transmitting to Europe collections of Peruvian and Chilian plants; and was the first discoverer of many species of great interest and beauty, which have been described, from the specimens gathered by him, chiefly in Sir W. J. Hooker's various publications, in which also

occasional letters from him on the subject of his botanical pursuits will be found.

At the election which subsequently took place, the Lord Bishop of Norwich was re-elected President; Edward Forster, Esq., Treasurer; John Joseph Bennett, Esq., Secretary; and Richard Taylor, Esq., Under-Secretary. The following five Fellows were elected into the Council in the room of others going out: viz. Arthur Aikin, Esq.; Rev. Frederic William Hope; William Horton Lloyd, Esq.; Richard Owen, Esq., and William Yarrell, Esq.

June 6.—Edward Forster, Esq., V.P., in the Chair.

Read the conclusion of Professor Forbes's memoir "On the *Ophiuridæ* of the Ægean Sea."

The author commences this portion of his paper by a revised character of the genus *Ophioderma* of Müller and Troschel, as follows:—

OPHIODERMA.

Corpus orbiculare, squamosum, granulosum, ad peripheriam radiatum; radiis simplicibus squamosis; disco in radiorum origines prolongato, infrà poris genitalibus viginti; squamis radiorum lateralibus adpressis, in marginibus superioribus spiniferis, spinis simplicibus; ossiculis ovarialibus parvis, oralibus pectinatis.

The species on which this genus is founded, *Ophiura lacertosa*, Lam., is stated to be rare in the Ægean Sea, and is thus characterized:—

Oph. lacertosa.

O. radiis convexiusculis; squamis superioribus transversè oblongis: lateralibus 8-spiniferis: inferioribus quadratis.

Of the genus *Ophiomyxa* of the same authors, Professor Forbes also gives the following revised character:—

OPHIOMYXA.

Corpus pentagonale, coriaceum, læve, ad peripheriam radiatum; radiis simplicibus, interruptè squamosis; disco in radiorum origines prolongato; squamis radiorum lateralibus spiniferis, spinis serrulatis; ossiculis ovarialibus binis parvis, oralibus spinis serrulatis armatis.

The Ægean species, *O. lubrica*, Forbes, was found in between ten and twenty fathoms water in the sea of the Cyclades.

For a new species not uncommon in the seas of the Archipelago, the author establishes the genus—

OPHIOPSILA, *Forbes.*

Corpus orbiculare, coriaceum, læve, ad peripheriam radiatum; radiis simpliciter squamosis, infra discum insertis; squamis lateralibus subcarinatis spiniferis, spinis simplicibus; ossiculis ovarialibus parvis, oralibus ad latera nudis.

OPH. ARANEA, *Forbes.*

Another new genus is constituted for the reception of the long-rayed, scaly and smooth-bodied *Ophiuridæ*, with simple tentacula and smooth spines, and is characterized as follows:—

AMPHIURA, *Forbes.*

Corpus orbiculare, squamosum, læve, ad peripheriam radiatum; radiis simplicibus squamosis, infra discum insertis; squamis lateralibus sub-

carinatis spiniferis, spinis simplicibus; ossiculis ovarialibus parvis, oralibus ad latera nudis; cirrhis simplicibus.

Three species inhabit the Ægean Sea, of which one is undescribed. Their characters are thus given:—

A. FLORIFERA, *Forbes.*

A. disco squamis centralibus maximis rosulatis, scutellis ovatis disjunctis, squamis radiorum superioribus quadratis: inferioribus trilobatis: lateralibus 3-spiniferis; spinis brevissimis linearibus simplicibus.

A. neglecta, Forbes.

A. disco squamis centralibus parvis rosulatis, scutellis oblongis conjunctis, squamis radiorum superioribus quadratis: inferioribus oblongis: lateralibus 4—5-spiniferis; spinis brevibus simplicibus.

Ophiura neglecta, *Johnston.*

A. Chiajii, Forbes.

A. disco squamis minutis rosulatis, scutellis cuneatis divergentibus apicibus approximatis, squamis radiorum superioribus lenticularibus: inferioribus quadratis sulcatis: lateralibus 4-spiniferis; spinis longis simplicibus.

Ophiura filiformis, *Chiaje* (nec *Müller*).

Lastly, the author adopts the genus *Ophiothrix* of Müller and Troschel, with the following revised character:—

OPHIOTHRIX.

Corpus orbiculare, spinosum, ad peripheriam radiatum; radiis simplicibus, squamosis, squamis superioribus imbricatis, lateralibus carinatis spiniferis; spinis serrulatis; ossiculis ovarialibus parvis, oralibus ad latera nudis; cirrhis pinnatis.

Ophiothrix Rosula is common in the Ægean Sea.

Figures are given of all the new genera and species, with numerous magnified details.

BOTANICAL SOCIETY OF LONDON.

Aug. 4, 1843.—J. E. Gray, Esq., F.R.S. &c., President, in the Chair.

Read "Notes on a variety of *Rosa sarmentacea* (Woods) (found near Bridgewater by Mr. Clarke)," by Mr. Edwin Lees, F.L.S. &c.

Mr. Lees had known this variety for some years; and though there was considerable difference in the more or less deeply cut serratures of the foliage, he always found the calyx to be fringed with stalked glands as well as the flower-stalks; the tube is generally but sparingly so, or even naked. It is abundantly covered with glands in this specimen, which is, therefore, a more than usually glandulose variety of *R. sarmentacea.* In some MS. observations on this species made in 1836, Mr. Lees observed:—

"Calyx pinnate, rather densely covered with glandular bristles, which, united to a purplish bloom on their segments as well as on the tube, gives this rose a peculiar and very elegant appearance."

The petioles are always more or less glandular, without prickles, differing in this respect materially from *R. canina,* as well as in the particulars mentioned above.

Mr. Lees had often observed, that the young foliage of this species

has a faint but very perceptible cowslip-like scent, by which he could always tell it when not in flower, but had never observed this in the leaves of *R. canina.*

Mr. Lees contended for *R. scabriuscula* being a good species, though it must be observed, that the calyx-tube varies in being more or less covered with stalked glands, and therefore Smith is wrong in the 'English Flora' in saying with regard to it, "quite smooth and naked."

The character of the plant as differing from *R. canina* is in the glandulosity of the pinnate calyx and peduncle, and in the petioles being slightly glandular, without prickles, or with very weak ones.

This variety was not, as far as Mr. Lees's observations had gone, abundantly distributed, being somewhat local and plentiful only in particular places.

Read also "Notice of the Mosses found in the neighbourhood of Bristol," by Mr. G. H. K. Thwaites.

The author enumerated 133 species as indigenous to that locality, several of which appear to be new to the British Flora. Amongst those most interesting to the British muscologist may be noticed the following:—

Gymnostomum viridissimum, *Sm.*
—— fasciculare, *Hedw.*
Didymodon Bruntoni, *Arn.*
—— rigidulus, *Hedw.*
—— crispulus, } *Wilson MSS.*
—— brachydontius, } *Wilson MSS.*
—— flexicaule.
Bryum albicans, *Wahl.*
—— atropurpureum, *W. et M.*
—— cernuum.
—— rostratum, *Schrad.*
Barbula rigida, *Hedw.*
—— convoluta, *Hedw.*
—— lævipila.
—— cylindrica, *Wilson MSS.*
—— latifolia, *Br. et Sch.*
Orthotrichum Rogeri, *Brid.*
Hookeria lucens, *Sm.*
Leucodon sciuroides, *Schwæg.*
Bartramia pomiformis, *Hedw.*
Hypnum riparium, *L.*
—— murale, *Hedw.*
—— piliferum, *Schreb.*
—— salebrosum, *Hoffm.*
—— crassinervum, *Wilson.*
—— strigosum?
—— circinnatum, *Brid.*
—— cæspitosum, *Sw.*
Tetraphis pellucida, *Hedw.*
Eucalypta streptocarpa, *Hedw.*
Weissia Starkeana, *Hedw.*
Trichostomum fasciculare, *Schrad.*
—— polyphyllum, *Schw.*
Grimmia orbicularis, *Br. et Sch.*
Funaria Muhlenbergii, β. patula.

The President drew the attention of the Society to an abnormal form of *Ophrys apifera* which had been sent to him by a lady from Dorking. The two lower flowers of the spike had two distinct united columns, the upper normal one being rather the larger and overlapping the other; the upper flowers had three columns united into a singular triangular mass; the upper petals of each of the flowers were rather reduced. The lip of the two lower flowers was small, and retained in part the usual character of the flower, but the lip of the top flower was lilac, and exactly resembled the sepals in form and colour. The three sepals of the middle flower were united together nearly to the lip, as was the case with two of the sepals of the terminal flowers. The ovaries of all the flowers were of the normal structure. The President stated that the Rev. Gerard E. Smith had

figured an *Ophrys* with a similar triple column, but his specimen was quite destitute of any lip.

The President observed, it might be worth while to examine if this excess of development of the column was always coexistent with the reduced development of the lip.

The President stated that this structure was quite distinct from the monstrosity of this plant described by Mr. Hincks, where each of the three petals was transformed into polleniferous columns.

ZOOLOGICAL SOCIETY.

Nov. 22, 1842.—William Yarrell, Esq., Vice-President, in the Chair.

A communication by Mr. Lovell Reeve, "On the genus *Phorus*, a group of agglutinating Mollusks of the family *Turbinacea*," was read.

"It is remarkable that a group of mollusks of such decided importance as those which I have selected for consideration should have so long escaped the especial notice of conchologists. The genus *Phorus* was introduced many years since by De Montford; but as it was not recognised by Lamarck, few authors thought it worthy of adoption. Little enough is known of the nature or anatomy of the *Phori*, but the remarkable character which their shells exhibit may be sufficiently estimated to rest their claim upon that alone to the rank of a genus.

"The character here alluded to is a property which these mollusks possess of agglutinating to the outer surface of their shells any fragments of stones, shells, corals, or other marine debris that they may chance to be in contact with, and which become so firmly attached that they cannot be dislodged without violence. The well-known Carrier Trochus (*Trochus agglutinans*, Lamarck; *Phorus onustus*, mihi) was for a long time the only species of *Phorus* known; when others even were discovered they were only regarded as varieties of that species, and the agglutinating property which they showed their animal occupants to possess, was not considered to be of any generic importance. The distinction however which De Montford assigned to these animals has become of infinite value, for we now possess several species of them, and the agglutinating power operates in different ways in each; some shells, for example, are found with only a few small pebbles agglutinated to the earlier whorls, whilst others are characterized by their having only such fragments of shells or stones as are flat or tile-shaped collected round the edge or periphery of the whorls; and these several methods of agglutinating are each confined to particular species. Other modifications of this property may yet be discovered, and I trust, as the *Phori* are not uncommon in the West Indies, that they will ere long be made the subject of anatomical examination.

"I see no reason at present for altering the situation which is commonly assigned to these mollusks in the general system; the structure and formation of the shell, as well as the presence of an operculum, seem sufficiently to indicate that they are allied to the *Trochi*, and not to the *Calyptrææ*, as supposed by Mr. Gray.

"I now proceed to lay seven species of this interesting genus before the Society, four of which are entirely new to me."

Genus Phorus.

Testa orbicularis, subconica, spirâ obtusâ, anfractibus regularibus, peripheriâ tubulis cavis interdum ornatâ, conchyliorum lapidumque frustis irregulariter agglutinatis; facie infernâ concaviusculâ, granosâ aut lamellosâ; umbilico amplo, profundo, sæpè ætate occultato; aperturâ depressâ, marginibus disjunctis, labro simplici, acuto. Operculum corneum tenue, ovale.

"Such are the characters which appear to me to apply generically to this group. The specific differences consist, not in the nature of the materials which are agglutinated, as supposed by Born and others, who had their *Trochi lithophorus* and *conchyliophorus*, for stones, shells and corals may often be found collected on the same individual; but in the perpetuated variations of the living shell, and the manner in which the surrounding debris become attached to it."

Phorus solaris. *Phor. testâ orbiculari, subconicâ, paucis calculis versus apicem agglutinatis; apice acuto; superficie striis obliquis et undulatis inscriptâ; anfractibus tubuloso-radiatis, tubulis tenuibus cavis, apertis; infernâ facie plano-concavâ, undulatim striatâ; aperturâ semicordatâ; umbilico angusto.*

Reeve, Conch. Syst., vol. ii. pl. 214. f. 1 and 2; Conch. Icon. Phorus, pl. 2. f. 5 *a* and *b*.

Trochus solaris, Linnæus, Lamarck, &c.

Hab. Malacca. (Found in coarse sand at the depth of seven fathoms.) Cuming.

"This very beautiful shell, in which the periphery of the whorls is extended throughout into hollow spouted spines, has never more than a few pebbles agglutinated to the first one or two whorls. The finest specimen I know of is in the collection of the Rev. Mr. Stainforth, and has furnished me with the drawing above referred to."

Phorus onustus. *Phor. testâ orbiculari, conicâ, brunnescente-albâ; anfractibus subangulatis, rudibus, vel conchyliis vel lapidibus agglutinatis; infernâ facie subconcavâ, rufâ; umbilico ætate occultato.*

Reeve, Conch. Syst., vol. ii. pl. 214. f. 3, and 215. f. 8; Conch. Icon. Phorus, pl. 1. f. 3 *a* and *b*.

Trochus agglutinans, Lamarck.

Trochus conchyliophorus, } auctorum.
Trochus lithophorus, }

Hab. West Indies.

This is the original and best known species of the group; it is by far the most profusely covered, and is generally heavily laden with shells, stones, or corals.

Phorus Indicus. *Phor. testâ orbiculari, convexo-conicâ, ad apicem acutâ, tenuissimâ, subtilissimè striatâ, albâ, supernè roseâ; anfractuum peripheriâ dilatatâ, acutissimâ; infernâ facie profundè umbilicatâ, fusco-fasciatâ, lamellâ laterali cavitatem formante.*

Reeve, Conch. Syst., vol. ii. pl. 215. f. 6; Conch. Icon. Phorus, pl. 1. f. 2.

Trochus Indicus, Gmelin, Lamarck.

Wägner, Supp. to Chemnitz, p. 129. pl. 229. f. 4062 *a*, *b*.

Hab. Cochin-China.

"I never remember having seen this shell with any shells or pebbles attached to it, but the first two or three whorls sufficiently indicate that some have been agglutinated to it at one time or another by the numerous indentations which they exhibit. The under surface of the shell is generally marked with a circular brown band, the centre being widely umbilicated."

Phorus exutus. *Phor. testâ orbiculari, depresso-conicâ, ad apicem acutâ, rosaceo-fulvâ, tenuissimâ, volutâm peripheriâ inconcinniter undulatâ, dilatatâ, superficie diagonaliter striatâ et sulcatâ; infernâ facie pallidâ, nitente, striatâ, versus marginem granosâ, lamellâ cavitatem formante.*

Reeve, Conch. Syst., vol. ii. pl. 215. f. 9 and 10; Conch. Icon. Phorus, pl. 2. f. 7 *a* and *b*.

Hab. —— ?

"This shell exhibits very slight evidence of ever having had any matter agglutinated to it. It somewhat resembles the preceding species, but may be readily distinguished by the elaborate manner in which the whorls are diagonally carved with grooves and striæ. The periphery of each whorl is most unusually dilated beyond their laminal bases; it is exceedingly thin and fragile, and very unevenly undulated."

Phorus calculiferus. *Phor. testâ orbiculari, convexo-conicâ, tenui, subtilissimè granosâ et striatâ, volutis calculis et conchyliorum frustis supernè symmetricè ornatis; facie infernâ profusè granosâ et striatâ.*

Reeve, Conch. Syst., vol. ii. pl. 215. f. 7; Conch. Icon. Phorus, pl. 1. f. 1.

Hab. —— ?

"I have seen several specimens of this very pretty species; the shell is of a bright subrosaceous fawn-colour, and entirely covered with fine diagonal striæ and cross grains. The agglutinating property seems confined to the upper portion of the whorls, so that there is always a band of fine pebbles or shells around the sutures, and they exhibit a regular increase in their selection as the agglutinating surface increases with the growth of the shell."

Phorus pallidulus. *Phor. testâ solidâ, albâ, acutissimè pyramidali, volutis angulatis conchyliorum frustis sparsis agglutinatis; infernâ facie leviter concavâ, pallidulâ, subtilissimè striatâ.*

Reeve, Conch. Syst., vol. ii. pl. 214. f. 4; Conch. Icon. Phorus, pl. 1. f. 4.

Hab. Coast of Japan: Siebald.

This shell is most nearly allied to the *Phorus onustus*; it is very solid, sharply pyramidal, and of a singular live pallid appearance. There are two or three specimens of it in the collection of H. Cuming,

Esq.; and the fragments of shells which are agglutinated indiscriminately to the area of the whorls are very much broken in all, though the shells to which they are agglutinated are in every respect live and perfect.

Phorus corrugatus. *Phor. testâ orbiculari, obeso-conicâ, albâ, diagonaliter corrugatâ, volutarum peripheriâ conchyliorum lapidumque frustis planis ornatâ; facie infernâ pallidâ, leviter granosâ et striatâ.*

Reeve, Conch. Syst., vol. ii. pl. 214. f. 5; Conch. Icon. Phorus, pl. 2. f. 6.

Hab. ——?

The method or disposition of the agglutinated fragments in this species is very peculiar and distinct from that in any other. The generic property is here confined to the base of the whorls, and the fragments which become attached are all inserted edgewise, ranging with great regularity side by side. The specimen above described is in the collection of the Rev. Mr. Stainforth.

Mr. Cuming exhibited to the Meeting the various species of *Phorus* referred to in the above communication, and also a series of specimens of the genus *Pecten*, descriptions of which, by G. B. Sowerby, Jun., were read. The species described are figured in Sowerby's 'Thesaurus Conchyliorum.'

Pecten pictus, Thes. Conch. pl. 20. f. 233. *Pect. T. obliquè ovatâ, compressâ; auriculis subæqualibus, radiatim sulcatis, ad basim emarginatis, ad margines undulatis; lateribus striatis; costis* 13, *triangulatis, elevatis, lævibus; interstitiis angustis, bisulcatis, crenatis; colore pallidè fulvo, fasciis et punctis et lineis rubris variegato; intùs albo.* Long. 0·80; lat. 0·25 poll.

Hab. Ins. Baiæ, Ins. Negros, Philippinarum. H. Cuming legit. Found in coarse sand at a depth of seven fathoms.

Equivalve, nearly equilateral, flat, with thirteen nearly triangular ribs, slightly flattened at the upper angle; the ears nearly equal, and the general characters of the species indicating some degree of affinity with the group containing *P. Radula.*

Pecten superbus, Thes. Conch. pl. 12. f. 11. *Pect. T. subovali, obliquâ, posticè expansâ, compressâ, crassâ; auriculis parvis, obtusis; costis* 23, *crassis, rotundatis, lævibus, interstitiis angustis; colore propè umbones roseo, propè margines pallidè luteo, fasciis rubris, præruptis, angulatis variegato.* Long. 2·40; lat. 0·65; alt. 2·60 poll.

Hab. ——? Mus. H. Cuming.

Flat, solid, obliquely oval, with the auricles small, obtuse; twenty-three rounded, smooth, thick ribs; the general colour pale straw, pink at the umbones, variegated with interrupted angular bands of brightish red.

Pecten velutinus, Thes. Conch. pl. 13. f. 31. *Pect. T. subovali, subcompressâ, æquilaterali, radiatim leviter striatâ, ad marginem subinflatâ; auriculis subæqualibus, striatis, margine obliquè pli-*

cato; costis 5, *crassis, rotundatis, gradatim declinantibus; colore fulvo-rufescente, fasciis albis, angulatis, subtùs fusco-marginatis variegato; intùs albo.* Long. 1·15; lat. 0·37; alt. 1·25 poll.

Hab. Macassar. Hinds legit.

Nearly oval, rather flat, equilateral, with fine radiating striæ; auricles nearly equal, striated; hinge obliquely plicated; ribs five, rounded, not very deep; colour dull fawn, variegated with angular bands of white edged with brown lines. The whole surface of the shell has a somewhat velvety appearance.

Pecten serratus, Thes. Conch. pl. 13. f. 56. *Pect. T. obliquè ovali, irregulari, posticè subproductâ, subcompressâ; auriculis inæqualibus, posticis minoribus, costis numerosis, minutissimè squamiferis; colore sulphureo, maculis magnis fuscis variegato, intùs ad marginem purpureo.* Long. 1·20; lat. 0·50; alt. 1·40 poll.

Hab. ad Insulas Philippinas. H. Cuming legit. Found under stones at low water on the island of Zebu.

Resembling *P. squamosus*, but more oblique and more ventricose, with the scales more minute.

Pecten albolineatus, Thes. Conch. pl. 14. f. 69. *Pect. T. ovali subtrigonâ, compressâ, æquivalvi; auriculis inæqualibus, posticis minimis, anticis magnis, acutis, sulcatis; costis numerosis, æqualibus, subquadratis; interstitiis griseo-maculatis, valvæ sinistræ costis griseis, lineis albis interruptis, costarum tribus albis.* Long. 0·93; lat. 0·25; alt. 1·19 poll.

Hab. Ins. Guimaras, Philippinarum. Found under stones at low water.

Resembling *P. ornatus*, Lam., but with the ribs more numerous, equal and regular.

Pecten singaporinus, Thes. Conch. pl. 13. f. 151, et pl. 18. f. 71. *Pect. T. rotundatâ, subtrigonâ, subcompressâ, æquivalvi, subæquilaterali, subtenui; auriculis inæqualibus; anticis magnis; costis* 24 *elevatis, subquadratis, lævibus; colore albo, pallidè roseo tincto, radiis quatuor latis, fusco-maculatis; prope umbones griseo maculato.* Long. 1·30; lat. 0·40; alt. 1·30 poll.

Hab. Singapore. Found in coarse sand at the depth of six fathoms.

More depressed spreading and circular than *P. Tranquebaricus*.

Pecten crassicostatus, Thes. Conch. pl. 15. f. 111. pl. 17. f. 152. *Pect. T. subtriangulari, crassâ, subæquilaterali, sublævi; auriculis inæqualibus, costas squamiferas ferentibus; costis* 24, *crassis, elevatis, subquadratis, annulatis; lateralibus squamiferis; interstitiis ferè lævibus, colore pallidè purpureo, vel aurantiaco.* Long. 4·50; lat. 1·50; alt. 4·30 poll.

Hab. Japan. Mus. H. Cuming.

A much larger and more solid shell than *P. senatorius*, with the ribs much more elevated and more square.

Pecten splendidulus, Thes. Conch. pl. 20. f. 246. *Pect. T. ovali, subtrigonâ, tenui, compressâ, ad latera angulatâ; auriculis valdè inæqualibus, squamoso-sulcatis, complanatis; anticis latis, elonga-*

tis; sinu magno; costis 25, *concinnis, subdistantibus, rotundato subquadratis, squamas acutas erectas, distantes ferentibus; colore rubro, maculis albis elongatis, ad auricula lateraque fasciatim variegato.* Long. 1·20; lat. 0·35; alt. 1·35 poll.

Hab. Singapore. Mus. H. Cuming. Found at a depth of six fathoms in coarse sand.

A much more compressed and regularly-formed shell than *P. varius.*

Pecten Pseudolima, Thes. Conch. pl. 20. f. 235. *Pect. T. rotundato-ovali, subobliquâ, subæquivalvi, ventricosâ; auriculis inæqualibus, squamoso-sulcatis; anticis elongatis, acutis, valvæ dextræ ad marginem spinosis; posticis parvis obtusis; costis* 27, *crassiusculis, bisulcatis, subrotundatis, squamarum acutarum series tres ferentibus; interstitiis angustis planis; colore aurantiaco, albo* (*præcipuè ad umbones*) *variegato.*

Hab. Jacna, ad Ins. Bohol, Philippinarum. H. Cuming legit.

The ribs are beautifully ornamented by three rows of close, sharp, erect, slightly curved scales.

Mr. Sowerby also characterized a new species of *Rostellaria.*

Rostellaria curta, Thesaurus Conchyliorum, part i. pl. 5. f. 7. *Rost. testâ crassâ, lævi, fusiformi; apice leviter plicatâ; anfractibus numerosis planis; canali postico super anfractûs penultimæ partem decumbenti; canali antico brevi, recto; labio interno crasso; labio externo subexpanso, dentibus sex irregularibus; colore fulvo, fasciâ latâ castaneâ partem posticam anfractuum decurrente.*

Hab. —— ? Mus. Cuming.

The whorls of this species are flatter than in *Rostellaria curvirostrum*; the last whorl is much shorter and the anterior canal is straight. The outer lip being irregular, led me at first to suppose that the specimen from which the description is taken might be one of the common species in which the completed aperture had been prematurely formed, it being well known that *R. curvirostrum,* in a young state, has the beak straight. But a slight difference in the shape of the whorls, the broad chestnut bands on the upper part of them, and the fact of several other specimens precisely similar having been seen by Mr. Cuming at Berlin, have determined me to describe this as a new species, which I now do with little hesitation.

Mr. Gould exhibited a new species of Parrot belonging to the genus *Coryphilus,* whch he characterized as follows:—

Coryphilus Dryas. *Cor. vittâ frontali metallicè viridi, cærulescente verticem versus; hujus plumis elongatis et saturatè cæruleis; dorso et alis obscurè viridibus, uropygio, caudæ tectricibus, et crisso pallidè viridibus, caudæ rectricibus albis, marginibus pallidè virescenti-cæruleo tinctis; loris albis, pectore vittâ saturatè cæruleâ ornato; abdomine albo, femoribus saturatè cæruleis.*

A band of verditer-green crosses the forehead, changing into blue towards the crown, the feathers of which are lengthened and of a deep blue, with a narrow line of shining paler blue down the centre of each; back and wings dull verditer-green; rump, upper and under

tail-coverts light verditer-green; primaries black, margined on the outer webs with deep greenish blue; tail-feathers white, gradually passing into pale greenish blue on their margins, and the shafts brown; lores white; throat and front of the neck deep blue, each feather with a spot of white at the tip; breast crossed by a band of deep blue; abdomen deep blue, each feather largely tipped with white; thighs deep blue; bill dark horn-colour; feet yellowish white.

Total length, $7\frac{1}{4}$ inches; bill, $\frac{7}{16}$; wing, $4\frac{3}{4}$; tail, $3\frac{1}{4}$; tarsi, $\frac{1}{2}$.

Hab. The Marquesas Islands.

From the indistinct character of the markings of the throat and abdomen, the bird from which the above description was taken would appear to be somewhat immature.

Mr. H. E. Strickland then communicated to the Meeting a list of the Birds in the Chinese collection now exhibiting at Hyde Park Corner:—

"In the present very imperfect state of our knowledge of Chinese zoology, any contribution, however small, becomes valuable, and I have therefore thought it worth while to draw up as accurate a list as I can of the species of birds contained in the very interesting collection of Chinese productions now exposed to public view. Most of the species enumerated exist also in the British Museum, where the kindness of Mr. G. R. Gray has aided me in identifying them."

N.B. The Nos. refer to the printed catalogue and to the specimens.

Case 19, No. 374. *Euplocamus nycthemerus,* (Linn.)*

375 & 376. *Polyplectron Hardwickei,* Gray.

377 & 378. *Thaumalea picta,* (Linn.)

379. *Paradisea sanguinea,* Shaw.

380 & 382. *Paradisea apoda,* Linn.

381. *Cicinnurus regius,* (Linn.)

383. *Cygnopsis cygnoides,* (Linn.)

Case 21, Nos. 385 & 386. *Phasianus torquatus,* Gm. This is the true wild Ring-necked Pheasant indigenous to China. The Ring-necked Pheasants sometimes shot in this country are supposed to be a mixed breed between this species and *P. colchicus.*

387. *Aix galericulata,* (Linn.)

388. *Oriolus chinensis,* Linn.

389. *Arborophila sphenura,* (Gray.)

390. *Acridotheres cristatellus,* (Gm.)

391. *Lanius erythronotus,* Gould.

392. *Centropus.* Several of the Asiatic species of this genus are as yet so imperfectly determined that I do not venture to affix a specific name to this bird.

393. *Ceryle varia,* Strickl. This, which is the Eastern representative of the *C. rudis* of Europe and Africa, is distinguished by the round black spots on the throat and the greater amount of white on the upper parts.

* The brackets ( ) imply that the authority refers to the *specific names only.*

394. *Gallinula gularis,* Horsf.
395. *Coturnix communis,* Bonn.
396. *Fuligula cristata,* Steph.
Case 22, Nos. 398 & 399. *Rollulus cristatus,* (Gm.)
400 & 401. *Gallus bankiva,* Temm.
402. *Turnix pugnax,* (Temm.)
403. *Acridotheres ialla,* (Horsf.)
404. *Palæornis bengalensis,* (Gm.)
405. *Acridotheres sericeus,* (Gm.) This species is quite distinct from *A. dauricus,* Pall., with which it is united by Wagler.
406. *Hæmatornis jocosus,* (Linn.)
407. *Merops philippinus,* Linn.
408. *Palæornis torquatus,* Vig.
409. *Amadina punctularia,* (Linn.)
410 & 411. *Amadina oryzivora,* (Linn.)
412. *Pyrrhulauda gingica,* (Gm.) (*Fringilla cruciger,* Temm.)
413. *Merops viridis,* Linn.
414. *Acridotheres malabaricus,* (Gm.)
415. *Palæornis torquatus,* Vig. Female.
416. *Amadina malacca,* (Linn.)
417. *Hydrophasianus sinensis,* (Gm.)
418. *Psittacus sinensis,* Gm.
419. *Anser albifrons,* (Gm.)
420. *Phalacrocorax.* An immature specimen, apparently identical with *P. carbo,* (Linn.) of Europe.
423. *Xema,* apparently referable to *X. ridibundum,* (Linn.)
424. *Rhynchaspis clypeata,* (Linn.)
There are also in Case 22, but without numbers, the two following: *Porzana rubiginosa,* (Temm.), and *Rallus gularis,* Horsf.
Case 51, Nos. 862 and 863. *Francolinus perlatus,* (Gm.)
864. *Querquedula falcaria,* (Pall.)
866. *Coturnix chinensis,* (Linn.)
867. *Lanius lucionensis,* (Linn.)
868. *Ianthocincla canora,* (Linn.)
869 & 875. *Coccothraustes melanurus,* (Gm.)
870 & 871. *Pyrgita rutilans,* (Temm.)
872 & 873. *Psittacula galgula,* (Linn.)
874. Apparently the young of *Melophus Lathami,* Gray.
876. *Turdus,* apparently referable to *T. merula,* Linn., fem.
877. *Gallinula chloropus,* (Linn.)
878. *Gallinula phœnicura,* (Gm.)
879. *Dafila acuta,* (Linn.)
880. *Calænas cruenta,* (Gm.)
Case 52, No. 884. *Querquedula formosa,* (Georgi.)
885. *Coturnix communis,* Bonn.
886. *Anthus.* This genus is at present imperfectly worked out, and it is therefore difficult to attach a specific name accurately to the above specimen.
887. *Herodias garzetta,* (Linn.)
888. *Oriolus chinensis,* Linn.

889. *Asio brachyotus*, (Linn.)
890. *Halcyon atricapilla*, (Gm.)
891. *Copsychus longirostris*, (Swains.)
892. *Carduelis sinica*, (Linn.) (*Fringilla kawariba*, Temm.)
893. *Melophus Lathami*, Gray.
894. *Gallinula phœnicura*, (Gm.)
895. *Liothrix sinensis*, (Gm.)
896. *Yunx torquilla*, Linn.
897. *Mareca penelope*, (Linn.)
898. *Querquedula crecca*, (Linn.)
Case 54, Nos. 917 and 921. *Argus giganteus*, Temm.
918 & 920. *Turtur suratensis*, (Gm.)
919. *Acridotheres tristis*, (Linn.)
922. *Palæornis malaccensis*, (Gm.)

"The birds above enumerated were obtained by Mr. Dunn during his residence at Canton. Some of them appear to have been imported thither from Malacca, and the remainder form but a small sample of the zoological treasures that might be obtained were the Chinese Empire opened to naturalists. It seems strange that so little has yet been done to obtain specimens of Chinese zoology through the medium of the natives. Thousands of bird-skins are annually sent to Europe by the natives of Brazil, Senegal and Malacca, and there can be no reason why a similar trade should not be established with China. All that the Chinese want is a little instruction in the art of preserving specimens, which might be easily communicated if some of the merchants connected with the tea-trade would take an interest in the subject." H. E. S.

ROYAL SOCIETY.

March 30, 1843.—"Researches into the Structure and Developement of a newly discovered parasitic Animalcule of the Human Skin, the *Entozoon folliculorum*." By Erasmus Wilson, Esq., Lecturer on Anatomy and Physiology at the Middlesex Hospital.

While engaged in researches on the minute anatomy of the skin and its subsidiary organs, and particularly on the microscopical composition of the sebaceous substance, the author learned that Dr. Gustow Simon* of Berlin had discovered an animalcule which inhabits the hair follicles of the human integument, and of which a description was published in a memoir contained in the first Number of Müller's Archiv for 1842. Of this memoir the author gives a translation at full length. He then states that, after careful search, he at length succeeded in finding the parasitic animals in question, and proceeded to investigate more fully and minutely than Dr. Simon had done the details of their structure, and the circumstances of their origin and developement. They exist in the sebaceous follicles of almost every individual, but are found more especially in those persons who possess a torpid skin; they increase in number during sickness, so as in general to be met with in great abundance after

* See a notice of Dr. Simon's paper in this Journal, vol. x. p. 49.

death. In living and healthy persons, from one to three or four of these entozoa are contained in each follicle. They are more numerous in the follicles situated in the depression by the side of the nose; but they are also found in those of the breast and abdomen, and on the back and loins. Their form changes in the progress of their growth. The perfect animal presents an elongated body, divisible into a head, thorax, and abdomen. From the front of the head proceed two moveable arms, apparently formed for prehension: and to the under side of the thorax are attached four pairs of legs, terminated by claws. The author distinguishes two principal varieties of the adult animal; the one remarkable for the great length of the abdomen and roundness of the caudal extremity; whilst the other is characterized by greater compactness of form, a shorter abdomen, and more pointed tail. The first variety was found to measure, in length, from the one-100th to the 45th, and the second, from the one-160th to the 109th part of an inch.

The author gives a minute description of the ova of these entozoa, which he follows in the successive stages of their developement. The paper is accompanied by numerous drawings of the objects described.

April 6.—" On the Structure and Developement of the Nervous and Circulatory Systems, and on the existence of a complete Circulation of the Blood in Vessels in the Myriapoda and the Macrourous Arachnida." By George Newport, Esq.

This paper is the first of a series which the author proposes to submit to the Royal Society on the comparative anatomy and the developement of the nervous and circulatory systems in articulated animals. Its purpose is, in the first place, to investigate the minute anatomy of the nervous system in the Myriapoda and the Macrourous Arachnida, and more especially with reference to the structure of the nervous cord and its ganglia; and thence to deduce certain conclusions with respect to the physiology of that system and the reflex movements in vertebrated animals; secondly, to demonstrate the existence of a complete system of circulatory vessels in the Myriapoda and Arachnida; and thirdly, to point out the identity of the laws which regulate the developement of the nervous and circulatory systems throughout the whole of the Articulata, and the dependence of these systems on the changes which take place in the muscular and tegumentary structures of the body, as, in a former paper, he showed was the case with regard to the changes occurring in the nervous system of true insects.

The first part of the paper relates to the nervous system. A description is given of this system in the Chilognatha, which the author was led, by his former investigations, to regard as the lowest order of the Myriapoda, and approximating most nearly to the Annelida. He traces the different forms exhibited by the nervous system in the principal genera of that order, the most perfect of which are connected on the one hand with the Crustacea, and on the other with true insects. Passing from these to the Geophili, the lowest family of the Chilopoda, which still present the vermiform

type, the nervous system is traced to the tailed Arachnida, the Scorpions, through Scolopendra, Lithobius and Scutigera; the last of which tribes connects the Myriapoda on the one hand with the true insects, and on the other with the Arachnida. The brain and the visceral nerves, the coverings and structure of the cord and ganglia, and the distribution of the systemic nerves are examined in each genus, but more particularly in the Scorpion, in which the nerves of the limbs are traced to the last joints of the tarsi, and those of the tail to the extremity of the sting. Especial attention is bestowed on the structure of the cord and its ganglia, and their developement during the growth of the animal. In the lowest forms of the Iulidæ, in which the ganglia are very close together, and hardly distinguishable from the non-ganglionic portions of the cord, the author has satisfactorily traced four series of fibres, a superior, and an inferior one, and also a transverse and a lateral series. The superior series, which he formerly described in insects as the motor tract, he has assured himself is distinct from the inferior, which he regarded as the sensitive tract; this evidently appears on examining the upper and under sides of a ganglionic enlargement of the cord. On the upper surface the direction of the fibres is perfectly longitudinal; while the fibres on the under surface are enlarged, and curvilinear in their direction. But he remarks that it is almost impossible to determine by experiment whether these structures are separately motor and sensitive, as formerly supposed, or whether they both administer to these functions by an interchange of fibres. These two series appear also to be separated in each ganglionic enlargement of the cord by the third series, constituting the transverse or commissural fibres, which pass transversely through the ganglia, and of which the existence was first indicated by the author in his paper on the *Sphinx ligustri*, published in the Philosophical Transactions for 1834. The author states that, in addition to these, there is in each half of the cord another and more important series of fibres, which constitute a large portion of the cord, but of which the existence has hitherto entirely escaped observation. This series forms the lateral portion of each half of the cord, and differs from the superior and inferior series in the circumstance, that while those latter series are traceable along the whole length of the cord to the subœsophageal and cerebral ganglia, the former series extends only from the posterior margin of one ganglion to the anterior margin of the first or second beyond it; thus bounding the posterior side of one nerve and the anterior of another, and forming part of the cord only in the interval between the two nerves. From this circumstance, the author designates the fibres of this series, *fibres of reinforcement of the cord.* Every nerve proceeding from a ganglionic enlargement is composed of these four sets of fibres, namely, an upper and an under one, communicating with the cephalic ganglia; a transverse or commissural, which communicates only with corresponding nerves on the opposite side of the body; and a lateral set, which communicates only with nerves from another ganglionic enlargement on the same side of the body, and which forms part of the cord in the interspace between the gan-

glia. The author had long suspected that this latter set of fibres existed; but he had never, until lately, ascertained their presence by actual observation. Their action seems fully to account for the reflected movements of parts both anterior and posterior to an irritated limb; as that of the commissural set does the movements of parts situated on the opposite side of the body to that which is irritated. In the ganglia of the cord in Iulus and Polydesmus, the fibres of the inferior longitudinal series are enlarged and softened on entering the ganglion, but are again reduced to their original size on leaving it; thus appearing to illustrate the structure of ganglia in general. In the developement of the ganglia and nerves in these genera, and also in Geophilus, the same changes take place as those which were formerly described by the author as occurring in insects; namely, an aggregation of ganglia in certain portions of the cord, and shifting of the position of certain nerves, which at first exist at ganglionic portions of the cord, but afterwards become removed to a non-ganglionic portion. The nervous cord is elongated, in order that it may keep pace with the growth of the body, which is periodically acquiring additional segments: that this elongation takes place in the ganglia is proved by these changes of position in the nerves lying transversely across the ganglia. The author infers from these facts, that the ganglia are centres of growth and nourishment, as well as of reflex movements, and that they are analogous to the enlargements of the cord in the vertebrata.

A series of experiments on the Iulus and Lithobius are next related; the result of which shows that the two supra-œsophageal ganglia are exclusively the centres of volition, and may therefore strictly be regarded as performing the functions of a brain: so that when these ganglia are injured or removed, all the movements of the animal are of a reflex character. When, on the other hand, these ganglia are uninjured, the animal movements are voluntary, and there exists sensibility to pain: there is, however, no positive evidence that the power of sensation does not also reside in the other ganglia.

The second part of the paper relates to the organs of circulation. In all the Myriapoda and Arachnida the dorsal vessel or heart is divided, as in insects, into several compartments, in number corresponding to the abdominal segments. Its anterior portion is divided, immediately behind the basilar segment of the head, into three distinct trunks. The middle portion, which is the continuation of the vessel itself, passes forwards along the œsophagus, and is distributed to the head itself; while the two others, passing laterally outwards and downwards in an arched direction, form a vascular collar round the œsophagus, beneath which they unite in a single vessel, as was first noticed by Mr. Lord in the Scolopendra. This single median vessel lies above the abdominal nervous cord, and is extended backwards throughout the whole length of the body as far as the terminal ganglia of the cord, under which it is subdivided into separate branches accompanying the terminal nerves to their final distribution. Immediately anterior to each ganglion of the cord, this vessel gives off a pair of vascular trunks; and each of these trunks is di-

vided into four arterial vessels, one of which is given to each of the principal nerves proceeding from the ganglion, and may be traced along with it to a considerable distance. Of these, the vessel situated most posteriorly is again connected with the great median trunk by means of a minute branch, so that the four vessels on each side form, with their trunks, a complete vascular circle above each ganglionic enlargement of the cord. Besides these, which may be regarded as the great arterial trunk and vessels conveying the blood directly from the anterior distribution of the heart to the limbs and inferior surface of the body, the author has also discovered a pair of large arterial vessels in each segment, originating directly from the posterior and inferior surface of each chamber of the heart. These vessels he has named *the systemic arteries*; and in the Scolopendra he has traced them from the great chamber of the heart, which is situated in the penultimate segment of the body, to their ultimate distribution and ramification in the coats of the great hepatic vessels of the alimentary canal.

After the blood has passed from the arteries, it is returned again to the heart in each segment of the body by means of exceedingly delicate transparent vessels, which pass around the sides of the segments and communicate with the valvular openings of each chamber of the heart at its upper surface, where the valvular openings are situated, not only in all the Myriapoda, but also in the Scorpionidæ. In Scorpions, the circulatory system is more complete and important than even in the Myriapoda. The heart, divided as in Myriapods into separate chambers, is lengthened out at its posterior extremity into a long caudal artery, and gives off a pair of systemic arteries from each chamber, precisely as in the Myriapoda. These arteries not only distribute their blood to the viscera, but send their principal divisions to the muscular structures of the inferior and lateral parts of the body, as well as to the pulmonary sacs. At the anterior part of the abdomen, the heart becomes aortic, descends suddenly into the thorax, and immediately behind the brain spreads out into several pairs of large trunks, which are given to the head, and to the organs of locomotion. The posterior of these trunks form a vascular collar around the œsophagus, beneath which they unite, anteriorly, to a strong bony arch in the middle of the thorax, to form the great arterial trunk, or supra-spinal vessel, which conveys the blood to the posterior part of the body, as in the Myriapoda. This vessel passes beneath the transverse bony arch of the thorax, and is slightly attached to it by fibrous tissue, which circumstance probably induced Professor Müller, who observed this structure in 1828, to regard it as a ligament. In its course backwards, along the nervous cord, this vessel is gradually lessened in size, until it arrives at the terminal ganglion of the cord in the tail, where it is divided into two branches, which take the course of the terminal nerves, and these are again subdivided before they arrive at their ultimate distribution. In addition to these parts, the author found a hollow fibrous structure, which closely surrounds the cord and nerves immediately after they have passed beneath the arch of the thorax. From the

sides of this structure there pass off backwards two pairs of vessels, that get beneath the peritoneal lining of the abdominal cavity and are distributed on the first pair of branchiæ. A small vessel also passes backwards beneath the cava, and, being joined by anastomoses from the spinal artery, form the commencement of a vessel which the author formerly described in the 'Medical Gazette' as the *subspinal vessel.* This vessel, extending along the under surface of the nervous cord, communicates directly, by short vessels, with the supra-spinal artery, and gives off, at certain distances from its under surface, several large vessels, which unite with others that convey the blood which has circulated through the abdominal segments, directly to the branchiæ, whence it is returned to the heart by many minute vessels that originate from the posterior internal part of each branchia, and, united into single trunks, pass around the sides of the segments to the valvular openings on the dorsal surface of the heart. In the tail of the Scorpion there is a direct vascular communication between the caudal artery and the subspinal vein, which, from the direction of the vessels, induces a belief that there is some peculiarity in the circulation of the blood in this part of the body. Besides these vessels, the author found an arterial trunk that originates from the commencement of the aorta as it descends into the thorax. This vessel passes backwards along the alimentary canal, to which it is distributed, and gives off branches to the liver.

This paper is accompanied by five drawings, illustrating the anatomical facts which are described in it.

May 11.—"Note regarding the Observations of T. Wharton Jones, Esq., F.R.S., 'On the Blood Corpuscles.'" By Martin Barry, M.D., F.R.S. L. & E.*

The author observes, that the structure of the blood-corpuscles can be accurately learned only by a careful investigation of their mode of origin, and by following them through all their changes in the capillary vessels, and especially in the capillary plexuses and dilatations, where all their stages of transition from the colourless to the red corpuscles may be seen. The filament which forms here and there in the corpuscles of coagulating blood he has shown to other persons, with Microscopes made by Ross and Powell. Dr. Barry denies that he meant certain general remarks in his paper, referring to more than twenty delineations of corpuscles from various animals, to apply exclusively to those of man.

May 25.—"On the Respiration of the Leaves of Plants." By William Haseldine Pepys, Esq., F.R.S.

The author gives an account of a series of experiments on the products of the respiration of plants, and more particularly of the leaves; selecting, with this view, specimens of plants which had been previously habituated to respire constantly under an inclosure of glass; and employing, for that purpose, the apparatus which he had formerly used in experimenting on the combustion of the diamond, and consisting of two mercurial gasometers, with the addi-

* A notice of Mr. Wharton Jones's communication appeared in the Number for May last.

tion of two hemispheres of glass closely joined together at their bases, so as to form an air-tight globular receptacle for the plant subjected to experiment.

The general conclusions he deduces from his numerous experiments conducted during several years, are, first, that in leaves which are in a state of vigorous health, vegetation is always operating to restore the surrounding atmospheric air to its natural condition, by the absorption of carbonic acid and the disengagement of oxygenous gas: that this action is promoted by the influence of light, but that it continues to be exerted, although more slowly, even in the dark. Secondly, that carbonic acid is never disengaged during the healthy condition of the leaf. Thirdly, that the fluid so abundantly exhaled by plants in their vegetation is pure water, and contains no trace of carbonic acid. Fourthly, that the first portions of carbonic acid gas contained in an artificial atmosphere, are taken up with more avidity by plants than the remaining portions; as if their appetite for that pabulum had diminished by satiety.

"On the minute structure of the Skeletons, or hard parts of Invertebrata." By W. B. Carpenter, M.D. Part II. "On the structure of the Shell in the several families and genera of Mollusca."

The author here gives in detail the results of his inquiries into the combinations of the component elements of shell as they are met with in the several families and genera of the Mollusca; and considers all these results as tending to establish the general proposition, that where a recognizable diversity presents itself in the elementary structure of the shell, in different groups, that diversity affords characters which indicate the natural affinities of the several genera included in those groups, and which may therefore be employed with advantage in classification, and in the recognition and determination of fossils.

June 15.—"On the supposed developement of the Animal Tissues from Cells." By James Stark, M.D., F.R.S.E.

The author controverts the prevailing theory of the developement of animal tissues from cells, and denies the accuracy of the microscopical observations on which that theory is founded, as regards the anatomy of the adult as well as of the fœtal tissues. He asserts that at no period of fœtal life can rows of cells be discovered in the act of transformation into muscular fibres: and he denies that these fibres increase either in length or in thickness by the deposition of new cells. He contends that the ultimate filaments of muscles, as well as all the other tissues of the body, are formed from the fibrinous portion of the blood, which is itself composed of globules that are disposed to cohere together, either in a linear series, so as to form a net-work of fine filaments, or in aggregated masses of a form more or less globular, composing what have been termed fibrinous corpuscles. These corpuscles have been considered to be the nuclei of cells; but the author regards them as being merely accidental fragments of broken down tissues, adhering to the filaments, and noways concerned in their developement. The more regularly disposed granules, which are observed to occupy the spaces intervening

between the filaments composing the ordinary cellular tissue, he considers as being fatty matter deposited within these spaces. He, in like manner, regards the observations tending to show the cellular origin of the fibrous, cartilaginous, and osseous tissues, as altogether fallacious; and maintains that the cells, which these animal textures exhibit when viewed under the microscope, are simply spaces occurring in the more solid substance of these structures, like the cavities which exist in bread. These views are pursued by the author in discussing the formation of the skin, the blood-vessels, and the nerves, and in controverting the theory of secretion, founded on the action of the interior surfaces of the membranes constituting cells.

"On the Organ of Hearing in Crustacea." By Arthur Farre, M.D., F.R.S.

The author finds that in the Lobster (*Astacus marinus*), the organ of hearing consists of a transparent and delicate vestibular sac, which is contained in the base, or first joint of the small antennæ; its situation being indicated externally by a slight dilatation of the joint at this part, and also by the presence of a membrane covering an oval aperture, which is the fenestra ovalis. The inner surface of the sac gives origin to a number of hollow processes, which are covered with minute hairs and filled with granular matter, apparently nervous. A delicate plexus of nerves, formed by the acoustic nerve, which is a separate branch supplied from the supra-œsophageal ganglion, is distributed over the base of these processes and around the sac. Within the sac there are always found a number of particles of siliceous sand, which are admitted, together with a portion of the surrounding water, through a valvular orifice at the mouth of the sac, being there placed apparently for the express purpose of regulating the size of the grains. The author considers these siliceous particles as performing the office of otolites, in the same way as the stones taken into the stomachs of granivorous birds supply the office of gastric teeth. Several modifications of this structure exhibited in the organs of hearing of the *Astacus fluviatilis*, *Pagurus streblonyx*, and *Palinurus quadricornis* are next described, and an explanation attempted of the uses of the several parts and their subserviency to the purposes of that sense.

The author concludes by a description of another organ situated at the base of the large antennæ, which it appears has been confounded with the former by some anatomists, but which the author conjectures may possibly constitute an organ of smell. The paper is accompanied by illustrative drawings.

MISCELLANEOUS.

ADDENDA AND EMENDATIONS TO MR. E. BLYTH'S LIST OF BIRDS OBTAINED IN THE VICINITY OF CALCUTTA.

To Richard Taylor, Esq.

Calcutta, May 12, 1843.

My dear Sir,—The last month has been a very productive one to me, in various classes of animals, and among the rest in that of

birds; hence I am enabled to rectify one or two matters of nomenclature in the paper which I sent you by last month's mail, and to add some more species to the catalogue.

First, for *Ichthyiaëtus cultrungius* you must substitute *Haliaëtus blagrus*, of which the former is merely the young, and place this species next to *Haliaëtus Macei*. Put it thus—

[*H. blagrus*. The young of this species I described as new by the appellation *Ichthyiaëtus cultrungius* (Journ. As. Soc. Beng. xi. 110). It is not uncommon along the river.] And add—

[*Ichthyiaëtus Horsfieldi*; *Falco ichthyiaëtus*, Horsfield; *Haliaëtus plumbeus*, Hodgson. Not rare upon the river. The mottled first plumage of the young much resembles the corresponding garb of *Milvus cheele*.]

Add, as a note, to *Gallinula chloropus*?—

[Since writing the above I have been favoured with a loan of the true *G. chloropus*, which I recognised as such at a glance, from the Mauritius; and the Indian species is certainly distinct, being characterized, in addition to its inferior size, by having the frontal shield much less developed, at all ages. It may be termed, therefore, *G. parvifrons*.—E. B.] Add also,—

[*Phyllopneuste trochilus*? This would seem to be distinguished from the British species by the darker colour of the head, and ashy tinge of the lower parts; also, I think, by the colour of the legs and size and form of the bill; moreover the *shikaree* who shot it informed me that it sung prettily, and on my imitating the well-remembered note of *Ph. trochilus*, he assured me that the song of this bird was quite different. I shall describe it together with about a dozen other species of this well-defined group.]

[*Sterna* (*Anoüs*) *tenuirostris*, nobis. Distinguished from *St. stolida* by its considerably inferior size, much more slender bill, and deeper and consequently more vividly contrasted colours of its plumage. A single specimen was brought fresh to Dr. M'Clelland, shot in the neighbourhood, which that naturalist has kindly presented to the Society.]

[*Gallus Bankivus*. I have received a specimen of this bird shot at about forty miles from Calcutta.]

[*Malaconotus* —— ? Distinct from all those noticed in Mr. Jerdon's catalogue under the generic head *Timalia*, and also from a new species from Western India (*M. Burvedii*, nobis), but which I think is figured in one of Buchanan Hamilton's drawings, though I have been unable to spare time to visit the Botanic Garden to consult them. Shot near Calcutta.]

The following synonyms may be attached to certain other species:—

To *Rhipidura fuscoventris*,—*Muscicapa* (*Muscylva*) *albogularis*, Lesson.

To *Tephrodornis superciliosus*,—*Lanius sordidus*, Lesson.

To *Cuculus niger*, add—Distinct from the Malayan *C. flavus*? and the Australian *C. cinerea*. According to Lesson, *C. flavus* extends both to India and Australia. I remain, yours very truly,

E. Blyth.

Calcutta, June 7, 1843.

My dear Sir,—The inclosed was to have been sent by last month's *express*, but owing to the weight (of letters) being made up about three hours before the usual time, it and numerous other letters were returned. It will now arrive, I fear, too late to be of service, but I will nevertheless send the following addenda and emendations, at a venture. *Ninox lugubris* is the *Strix scutulata*, Raffles, or *Str. hirsuta*, Temminck.—To *Athene brama* add *Noctua Tarayensis*, Hodgson, as a synonym.—After *Acrocephalus montanus* put No. 90 *a.*, a species nearly allied to the last, but smaller and more rufous, and which has recently been also obtained by Mr. Jerdon at Nellore, about 100 miles to the northward of Madras (*Nellore*, not *Vellore*). *Charadrius rufinus* is, I am now tolerably sure, the *Ch. Geoffroyi*, Lesson; and I have much reason to suspect that *Ch. rufinellus* is the *Ch. Leschenaultii* of the French.—I am happy to say I continue in good health, and overwhelmingly busy; and with kind remembrances, believe me to remain, my dear Sir, yours most truly,

E. Blyth.

[As these letters reached us too late for the addenda to be inserted along with the paper, we have preferred printing them without alteration from the author's MSS. letters.—Ed.]

METEOROLOGICAL OBSERVATIONS FOR JULY 1843.

Chiswick.—July 1. Overcast: clear. 2. Overcast throughout. 3. Fine. 4. Uniform haze: very fine. 5. Sultry: very hot. 6, 7. Cloudy and fine. 8. Cloudy: rain: clear. 9. Foggy: very fine. 10. Cloudy and fine. 11. Thickly overcast. 12. Very fine. 13. Light haze: rain. 14. Densely overcast: very fine. 15—17. Very fine. 18. Very fine: constant heavy rain after 3 p.m. 19. Cloudless in the morning: cloudy at noon: clear. 20. Very fine: slight rain: overcast: rain at night. 21. Cloudy and fine. 22. Rain. 23. Cloudy and squally: cold rain. 24. Clear: cloudy and fine: clear. 25. Overcast and fine: clear. 26. Overcast: slight rain. 27. Showery. 28. Cloudy and fine: rain. 29. Very fine. 30. Cloudy and fine: clear. 31. Hazy: cloudy and fine: clear.—Mean temperature of the month 1°·3 below the average.

Boston.—July 1. Fine. 2. Fine: rain early a.m. 3. Windy. 4. Fine. 5. Cloudy: heat 81°·5 4 o'clock p.m. 6. Windy: rain early a.m. 7. Fine: thunder-storm 5 p.m.: rainbow 6 p.m. 8. Rain: rain early a.m.: rain p.m. 9. Fine. 10. Cloudy. 11. Cloudy: rain p.m. 12. Fine: rain p.m. 13, 14. Cloudy: rain early a.m. 15, 16. Fine. 17. Cloudy. 18. Windy: rain p.m. 19. Fine. 20. Fine: rain p.m. 21. Fine. 22. Cloudy: rain p.m. 23. Windy: rain p.m. 24, 25. Fine. 26. Cloudy. 27. Windy: rain early a.m. 28. Cloudy. 29. Cloudy: rain early a.m. 30. Cloudy: rain p.m. 31. Fine: rain, with thunder and lightning p.m.

Sandwick Manse, Orkney.—July 1. Bright: rain. 2. Drizzle. 3. Bright: cloudy. 4. Bright: shower. 5. Bright: damp. 6. Thunder: fog: cloudy. 7. Bright: cloudy. 8—10. Bright: clear. 11. Clear. 12. Cloudy: damp. 13. Damp: cloudy. 14. Cloudy. 15, 16. Shower: cloudy. 17. Bright: cloudy. 18, 19. Showery. 20. Rain: cloudy. 21. Bright: clear. 22. Bright: cloudy. 23. Cloudy. 24. Bright: clear. 25. Bright: cloudy. 26. Cloudy: showers. 27. Showers: cloudy. 28. Bright: cloudy. 29. Cloudy: rain. 30, 31. Damp: drizzle.

Meteorological Observations made at the Apartments of the Royal Society, LONDON, *by the Assistant Secretary,* Mr. Roberton; *by* Mr. Thompson *at the Garden of the Horticultural Society at* CHISWICK, *near London; by* Mr. Veall, *at* BOSTON; *by the* Rev. W. Dunbar, *at Applegarth Manse,* DUMFRIES-SHIRE; *and by the* Rev. C. Clouston, *at Sandwick Manse,* ORKNEY.

Days of Month.	Barometer.								Thermometer.										
	London: Roy. Soc. 9 a.m.	Chiswick.		Boston. 8¾ a.m.	Dumfries-shire.		Orkney, Sandwick.		London: R.S.			Chiswick.		Boston. 8¾ a.m.	Dumf.-shire.		Orkney, Sandwick.	
1843. July.		Max.	Min.		9 a.m.	9 p.m.	9½ a.m.	8½ p.m.	Fahr. 9 a.m.	Self-reg. Mx.	Self-reg. Min.	Max.	Min.		Max.	Min.	9½ a.m.	8½ p.m.
1.	30·038	30·002	29·982	29·44	The Meteorological Observations from Applegarth Manse, Dumfries-shire, for July, have not yet been received.		29·76	29·56	64·3	74·3	54·0	69	52	63·5			54½	52
2.	30·018	29·995	29·964	29·31			29·53	29·52	62·8	69·6	56·0	73	58	66			57	53½
3.	30·036	29·992	29·967	29·32			29·36	29·63	65·8	86·3	60·8	76	59	69			62	53
☽ 4.	30·040	29·975	29·836	29·42			29·80	29·87	59·7	76·0	58·8	78	53	66			57½	53
5.	29·798	29·717	29·643	29·19			29·83	29·73	77·8	81·6	60·3	88	55	65			57	52
6.	29·842	29·915	29·751	29·13			29·45	29·62	64·4	85·6	59·0	73	51	61			57	54
7.	30·014	29·946	29·913	29·32			29·84	29·90	64·4	84·6	56·8	68	53	63·5			55	53
8.	29·940	29·941	29·876	29·37			29·98	30·12	61·8	69·3	56·6	62	45	59			58	53½
9.	30·016	29·977	29·954	29·46			30·15	30·17	58·4	65·7	51·6	73	47	67			57	55
10.	30·018	29·954	29·935	29·44			30·17	30·20	64·7	74·8	55·0	69	55	60			56	54
○ 11.	30·080	30·160	30·009	29·54			30·24	30·24	58·3	70·3	56·2	62	52	57			56	52½
12.	30·236	30·147	30·085	29·69			30·06	30·04	61·3	65·2	54·0	77	56	63			62	54½
13.	30·100	30·040	30·022	29·50			30·07	30·07	66·7	76·2	60·0	67	54	60·5			55½	52½
14.	30·130	30·059	30·048	29·56			30·03	29·93	57·2	70·5	56·3	76	53	59			58	57
15.	30·136	30·117	30·048	29·48			29·82	29·93	66·7	83·3	57·7	77	56	67			55½	54
16.	30·168	30·234	30·191	29·61			29·95	30·04	66·4	76·4	61·2	80	58	64·5			56	53
17.	30·318	30·242	30·143	29·59			29·97	29·90	69·2	76·2	60·7	81	57	69			55½	53
18.	30·036	29·975	29·784	29·26			29·72	29·67	66·8	80·8	61·2	75	49	66·5			53	52
☾ 19.	29·822	29·753	29·709	29·20			29·70	29·64	61·7	76·0	53·6	68	44	63			52	52
20.	29·838	29·756	29·690	29·22			29·44	29·47	58·7	71·2	50·3	67	54	59			50½	50
21.	29·738	29·818	29·682	29·12			29·54	29·73	63·3	67·3	57·2	66	55	62			51	52
22.	29·862	29·808	29·613	29·25			29·67	29·51	64·0	70·6	57·6	65	52	60			56½	52
23.	29·516	29·781	29·457	28·90			29·70	29·86	56·7	67·0	55·8	64	40	59			52	50
24.	30·088	30·128	30·016	29·52			29·99	30·11	58·8	64·4	48·6	65	42	58·5			52	50
25.	30·246	30·221	30·176	29·68			30·15	30·15	57·9	65·3	50·6	72	47	62			56	53
26.	30·304	30·249	30·171	29·70			29·99	29·85	66·2	67·8	55·9	72	56	67			63	54
● 27.	30·104	30·055	29·995	29·43			29·84	29·94	60·8	74·2	59·0	74	54	65			54	54
28.	30·090	30·002	29·955	29·47			29·92	29·69	61·9	70·4	57·8	73	58	60			55	53
29.	29·806	29·759	29·634	29·13			29·43	29·41	65·2	74·3	58·2	71	53	64			59	52½
30.	29·702	29·676	29·636	29·06			29·54	29·70	62·7	72·4	56·4	71	49	58			55½	51
31.	29·872	29·929	29·792	29·27			29·77	29·74	60·6	70·6	54·0	69	47	61			52	51½
Mean.	29·998	29·978	29·892	29·37			29·819	29·836	63·1	73·5	56·5	71·64	52·06	62·7			55·83	52·79

Days of Month.	Wind.					Rain.					Dew-point.
1843. July.	London: R.S. 9 a.m.	Chiswick. 1 p.m.	Boston.	Dumfries-shire.	Orkney, Sandwick.	London: R.S. 9 a.m.	Chiswick.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Lond. R.S. 9 a.m.
1.	w.	e.	w.		ssw.	......	......	......		......	56
2.	s.	sw.	w.		sw.	......	......	·22		·45	59
3.	s.	sw.	w.		sw.	......	......	......		·09	62
☽ 4.	n.	s.	w.		sw.	......	......	......		......	61
5.	se.	se.	calm		ese.	......	·16	......		......	66
6.	s.	sw.	sw.		se.	·255	......	·03		·26	62
7.	sw.	sw.	calm		nw.	......	·14	......		......	57
8.	e.	se.	calm		ese.	·216	·24	·41		......	56
9.	nw.	n.	calm		se.	·383	·02	·14		......	58
10.	nnw.	nw.	n.		nw.	·058	......	......		......	57
○ 11.	nw.	n.	ne.		w.	......	......	......		......	58
12.	nw.	nw.	calm		sw.	......	......	·09		......	57
13.	s.	sw.	calm		wnw.	......	·07	·32		·04	61
14.	nnw.	ne.	calm			·297	......	·06		......	58
15.	s.	sw.	calm		w.	......	......	......		·05	61
16.	w.	w.	nw.		wsw.	......	......	......		......	62
17.	s.	w.	w.		w.	......	......	......		......	64
18.	w.	sw.	w.		w.	......	·50	......		......	63
☾ 19.	nw.	w.	calm		n.	·477	·02	·34		·23	58
20.	w.	sw.	w.		nw.	......	·01	......		·65	56
21.	w.	w.	w.		n.	......	......	·06		·02	57
22.	s.	sw.	calm		nw.	......	·08	......		......	58
23.	w.	w.	w.		nnw.	·066	·08	·18		......	58
24.	w.	w.	calm		nnw.	·211	......	·07		·05	56
25.	w.	sw.	calm		se.	......	......	......		......	53
26.	s.	sw.	calm		s.	......	·10	......		......	55
● 27.	sw.	w.	w.		w.	·097	·02	·10		·07	59
28.	w.	w.	nw.		w.	·116	·06	......		......	55
29.	s var.	sw.	w.		var.	·019	·07	·30		·09	60
30.	s.	w.	w.		n.	·152	·07	......		·86	59
31.	w.	sw.	nw.		nw.	......	·03	·08		·06	58
Mean.						Sum. 2·347	1·67	2·40		2·92	Mean. 59

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——— Bismuth, Saxony,
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Babingtonite, Norway, 4*s.* to
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———, Carbonate of, Cumb
Barytocalcite, Cumberland,
Barytostrontianite, America,
Batrachite, Tyrol, 1*s.* 6*d.* to
Berthierite, Saxony, 2*s.* to 4
Beryll, common, Bavaria, U

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Chonikrite, Elba, 2*s.* to 4*s.*
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Corundum, India, Switzerland, 1*s.* to £2.
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Cryolite, Greenland, 2*s.* to 10*s.*
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Cyprine, Norway, 4*s.* to 10*s.*
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Davyne, Vesuvius, 2*s.* to 6*s.*
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Diallage, Harz, Alps, 1*s.* to 3*s.*
Diamond (Crystals), 10*s.* to £5.
Diaspor, Siberia, 3*s.* to £1.
Diatachite, Thuringia, 1*s.* to 3*s.*

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Diopside, Tyrol, Silesia, 1s. to 4s.
Dioptase, Siberia (Steppe of Kirgises), 6s. to £3.
Dipyr, Pyrenees, 2s. to 6s.
Disthene, Alps, America, 1s. to 4s.
Dolomite, Saxony, Alps, 1s. to 4s.
Dufrenite, France, Bavaria, 2s. to 6s.
Dysodyle, Rhine, Sicily, 1s. to 2s.
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Fluccrine, Sweden, 3s. to 10s.
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Gadolinite, Sweden, 2s. to 10s.
Gahnite, Sweden, 2s. to 8s.
Galena, Saxony, Harz, &c., 1s. to 4s.
Garnet, Alps, Saxony, Italy, &c., 1s. to 10s.
Gedrite, Pyrenees, 3s. to 6s.
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Geocronite, Sweden, 3s. to 6s.
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Glauconite, Saxony, 1s.
Glimmer, Saxony, Siberia, Alps, &c., 1s. to 3s.
Gmelinite, Ireland, 2s. to 6s.
Gœthite, Rhine, 2s. to 10s.
Gold, native, Siberia, Hungary, &c., 3s. to £2.
Grammatite, Alps, Sweden, 1s. to 3s.
Graphite, Moravia, Bavaria, 1s. to 2s.
Gray Antimony, Saxony, Harz, Hungary, 1s. to 4s.
—— Manganese, Harz, Rhine, 1s. to 4s.
Green Earth, Italy, 1s. to 3s.
Green Iron Earth, Saxony, 2s. to 4s.
Grenatite, Alps, Saxony, 1s. to 3s.
Grossular, Siberia, Tyrol, 3s. to 10s.
Gypsum, Harz, Alps, &c., 1s. to 4s.
Hard Falunite, Sweden, 2s. to 4s.
Harmotome, Harz, Scotland, 2s. to 8s.
Hausmannite, Thuringia, 2s. to 10s.
Hauyne, Rhine, Vesuvius, 1s. to 4s.
Hedenbergite, Elba, Sweden, 2s. to 6s.
Heliotrope, Persia, Tyrol, 2s. to 6s.
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Hepatite, Sweden, 1s. to 3s.
Herschelite, Sicily, 2s. to 4s.
Heteposite, France, 2s. to 6s.
Heterocline, Piedmont, 3s. to 6s.
Heulandite, Iceland, Harz, &c., 1s. to 10s.
Hisingerite, Sweden, 2s. to 4s.
Honey Stone, Thuringia, 1s. to 10s.
Hornblende, Saxony, Bohemia, Norway, &c., 1s. to 4s.
Hornstone, Saxony, Silesia, &c., 1s. to 2s.
Humboldtilite, Vesuvius, 3s. to 6s.
Humite, Vesuvius, 2s. to 6s.
Huraulite, France, 3s. to 6s.
Hyacinth, France, Ceylon, 1s. to 3s.
Hyalite, Bohemia, Rhine, 1s. to 4s.
Hyalosiderite, Rhine, 2s. to 6s.
Hydrargillite, Saxony, Bohemia, 2s. to 6s.
Hydrate of Manganese, America, 2s. to 9s.
Hydrated Oxide of Iron, Cornwall, Bohemia, 2s. to 10s.
Hydrophane, Saxony, 2s. to 4s.
Hydrophit, Sweden, 3s. to 6s.
Hypersthene, Italy, Bavaria, 1s. to 3s.
Hypochlorite, Saxony, 1s. to 2s.
Ice Spar, Vesuvius, Rhine, 1s. to 4s.
Ichtyophthalmite, Tyrol, 2s. to 6s.
Idocrase, Bohemia, Vesuvius, Norway, 1s. to 9s.

Idrialite, Carinthia, 3s. to 6s.
Ilmenite, Siberia, 3s. to 10s.
Ilvaite, Elba, 2s. to 6s.
Indicolite, Sweden, United States, 2s. to 4s.
Iridosmine, Siberia, 2s. to 6s.
Iron Flint, Saxony, Westphalia, 1s. to 3s.
—— Glanz, Elba, Saxony, &c., 1s. to 6s.
—— Meteorite, different localities, 4s. to £2.
—— Pyrites, Elba, Saxony, &c., 1s. to 6s.
Iserine, Silesia, 1s. to 2s.
Ittnerite, Rhine, 3s. to 6s.
Jade, Lake of Geneva, 2s. to 4s.
Jamesonite, Cornwall, Harz, 3s. to 6s.
Kakoxene, Bohemia, 2s. to 6s.
Kaolin, Saxony, 1s. to 2s.
Karpholite, Bohemia, 2s. to 8s.
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Kibdelophane, Tyrol, 2s. to 4s.
Kieselsinter, Iceland, 2s. to 4s.
Killinite, Ireland, 2s. to 4s.
Koccolite, Norway, 1s. to 3s.
Kollyrite, Bavaria, 2s. to 4s.
Kornite, Saxony, 1s. to 2s.
Kraurite, Bavaria, 3s. to 6s.
Krokydolite, Cape of Good Hope, 4s. to 10s.
Kyanite, Alps, America, 1s. to 4s.
Labradorite, America, Finland, 1s. to 4s.
Lanthan, Sweden, 2s. to 6s.
Lapis Lazuli, Persia, Siberia, 3s. to 10s.
Lasionite, Bavaria, Saxony, 2s. to 4s.
Laumonite, France, Scotland, 2s. to 6s.
Lava, Vesuvius, Rhine, &c., 6d. to 1s.
Lazulite, Styria, 2s. to 6s.
Lebererz (Mercury), Idria, 3s. to 6s.
Ledererite, United States, 3s. to s10.
Leelite, Norway, 1s. to 3s.
Lemnian Earth, Mediterranean, 1s. to 2s.
Lenzinite, Hessia, 1s. to 2s.
Lepidocrocite, Rhine, 1s. to 4s.
Lepidolite, Moravia, America, 1s. to 3s.
Leuzite, Vesuvius, Rhine, 1s. to 6s.
Levyne, Ireland, Bohemia, 2s. to 4s.
Libethenite, Hungary, 3s. to 10s.
Lievrite, Elba, 2s. to 10s.
Limonite, Saxony, 1s. to 2s.
Lithomarge (common), Saxony, &c., 1s. to 2s.
———— (ferriferous), Saxony, 1s. to 2s.
Loadstone, Elba, Sweden, 1s. to 4s.
Lucullan, Sunderland, 1s. to 2s.
Macle, Bavaria, France, 1s. to 4s.
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Magnetic Iron Ore, Tyrol, Elba, Sweden, 1s. to 3s.
———— Iron Pyrites, Bavaria, 1s. to 2s.
Malachite, fibrous, Rhine, France, &c., 2s. to 12s.
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Metaxite, Silesia, 2s. to 4s.
Miargyrite, Saxony, 6s. to 12s.
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Mocha-stone, India, 2s. to 10s.
Molybdate of Lead, Carinthia, 2s. to 10s.
Molybdena, Saxony, Tyrol, Sweden, 1s. to 3s.
Molybdic Ochre, Norway, 3s. to 6s.
Monazite, Siberia, N. America, 6s. to 12s.
Monticellite, Vesuvius, 3s. to 6s.
Moroxite, Norway, 2s. to 6s.
Mountain Cork, Alps, 1s. to 3s.
———— Leather, Alps, 1s. to 3s.
———— Meal, Saxony, 1s. to 2s.
———— Wood, Alps, 1s. to 3s.
Murchisonite, Devonshire, Germany, 1s. to 3s.

Muriate of Copper, Chili, 3s. to 10s.
———— of Mercury, Rhine, Mexico, 4s. to £1.
———— of Silver, Saxony, Peru, 4s. to £2.
Mussite, Silesia, 1s. to 3s.
Nacrite, Saxony, 1s. to 2s.
Naptha, Italy, 1s. to 2s.
Natrolite, Bohemia, Iceland, &c., 1s. to 6s.
Needle Coal, Saxony, 1s.
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Nepheline, Vesuvius, Saxony, &c., 1s. to 6s.
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——, Fire, Mexico, 6s. to £3.
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——, Noble, Hungary, 6s. to £2.
——, Wax, Hungary, 1s. to 3s.
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Pargasite, Finland, 2s. to 6s.
Paulite, N. America, 2s. to 4s.
Pearl Glimmer, Tyrol, 2s. to 4s.
—— Sinter, Italy, 2s. to 4s.
—— Spar, Saxony, Cumberland, 1s. to 3s.
—— Stone, Hungary, 1s. to 2s.
Peastone, Bohemia, 1s. to 2s.
Pectolite, Tyrol, 2s. to 4s.
Peganite, Saxony, 2s. to 4s.
Perikline, Tyrol, 1s. to 4s.
Peridote, Vesuvius, 2s. to 4s.
Petalite, Sweden, 2s. to 6s.
Petroleum, Italy, 1s. to 2s.
Pechstein, Saxony, Hungary, Scotland, 1s. to 2s.
Phacolite, Bohemia, 2s. to 4s.
Phæstine, Bavaria, 1s. to 3s.
Pharmacolite, Bohemia, Black Forest, 2s. to 4s.
Phenakite, France, Siberia, 3s. to £2.
Phillipsite, Vesuvius, 2s. to 4s.
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———— of Manganese, Bavaria, 2s. to 4s.
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Physalite, Sweden, 2s. to 6s.
Piknite, Saxony, 1s. to 4s.
Pikrolite, Saxony, Silesia, 1s. to 3s.
Pikrosmine, Saxony, 1s. to 3s.
Pikrophyll, Sweden, 3s. to 6s.
Pimelite, Silesia, 2s. to 4s.
Pinguite, Saxony, 2s. to 4s.
Pinite, Saxony, France, 1s. to 4s.
Pisolite, Bohemia, 1s. to 2s.
Pistacite, Norway, Alps, Saxony, 1s. to 10s.
Pitchblende (Uranium), Saxony, 1s. to 3s.
Pitchstone, Saxony, Scotland, &c., 1s. to 2s.
Pitchy Iron Ore, Rhine, Hungary, 1s. to 2s.
Pittizite, Saxony, 1s. to 3s.
Plagionite, Harz, 3s. to 10s.
Plasma, Baden, 2s. to 4s.
Platina, Ural, 2s. to £3.
Pleonaste, Tyrol, 2s. to 4s.
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Polyhallite, Salzburg, 2s. to 4s.
Polymignite, Norway, 3s. to 8s.
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Chalcolite, Saxony, 2*s*. to 4*s*.
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Chlorite, Tyrol, Silesia, 1*s*. to 2*s*.
Chlorite Earth, Alps, 1*s*. to 2*s*.

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Pumice, Italy, 6*d.* to 2*s.*
Pyknite, Saxony, 1*s.* to 4*s.*
Pyknotrop, Saxony, 1*s.* to 4*s.*
Pyrallolite, Finland, 3*s.* to 6*s.*
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Pyrolusite, Rhine, Saxony, 1*s.* to 2*s.*
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Pyrophyllite, Ural, 3*s.* to 10*s.*
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—— Copper Ore, Cornwall, Siberia, 2*s.* to 12*s.*
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—— Oxide of Zinc, America, 2*s.* to 4*s.*
—— Silver, Harz, Saxony, 2*s.* to £2.
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Sal Ammoniac, Vesuvius, 1*s.* to 3*s.*
Sapphire, India, America, 4*s.* to £3.
Sapphire Quarz, Salzburg, 1*s.* to 4*s.*
Sarcolite, Vesuvius, 3*s.* to 6*s.*
Saponite, Sweden, 1*s.* to 2*s.*
Sassolin, Italy, 1*s.* to 2*s.*
Saussurite, Switzerland, 1*s.* to 3*s.*
Scaly Talc, Sweden, 1*s.* to 3*s.*
Scapolite, Sweden, Norway, 1*s.* to 6*s.*
Scarbroite, Yorkshire, 1*s.* to 3*s.*
Scheelite, Saxony, 1*s.* to 4*s.*
Scheererite, Switzerland, 2*s.* to 4*s.*
Schieferspar, Saxony, 1*s.* to 2*s.*
Schillerspar, Harz, 1*s.* to 2*s.*
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Surturbrand, Iceland, 1*s.* to
Swimstone (Quarz), France,
Symplesite, Saxony, 3*s.* to 6*s*
Tabular Spar, Hungary, Swed
Tachylite, Hessia, 1*s.* to 2*s.*
Talc, Alps, Saxony, 1*s.* to 2*s*
Tantalite, N. America, Bavari
Tellur, foliated, Transylvani
——, graphic, ditto
——, native, ditto
——, silver, Siberia, 10*s.* to
Telluric Bismuth, Hungary,
Tennantite, Cornwall, 3*s.* to
Tetartine, Silesia, Alps, 1*s.* t
Tharandite, Saxony, 1*s.* to 3*s*
Thomsonite, Scotland, Vesuv
Thulite, Norway, Tyrol, 3*s.*
Tinstone, Bohemia, Saxony,
Tincal, Thibet, 1*s.* to 2*s.*
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Topaz, Saxony, Siberia, Irel
Topazolite, Bavaria, Piedmo
Tourmaline, common black, N
————, noble-coloured,
3*s.* to £4.
Tremolite, Alps, Bavaria, Sw
Triclasite, Sweden, 2*s.* to 8*s.*
Triphylline, Bavaria, 2*s.* to 6
Triplite, Bavaria, 2*s.* to 6*s.*
Tungstate of Iron, Bohemia,
———— of Lead, Bohemia,
———— of Lime, Bohemia,
Turquoise, Silesia, Persia, 2*s*
Uran Mica, Cornwall, Saxon
—— Ochre, Saxony, Bohem
Uwarowite, Siberia, £1 to £
Vanadiate of Lead, Scotland,
Vanadium Ironstone, Sweden
Variscite, Saxony, 2*s.* to 4*s.*
Vauquelinite, Siberia, 4*s.* to
Vesuvian, Vesuvius, Norway,
Vivianite, Bavaria, 2*s.* to 6*s.*
Wad, Rhine, Thuringia, 2*s.*
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Websterite, Sussex, 1*s.* to 4*s.*
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Pyknite, Saxony, 1s. to 4s.
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Pyrallolite, Finland, 3s. to 6s.
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Pyrophyllite, Ural, 3s. to 10s.
Pyrorthite, Sweden, 3s. to 6s.
Pyrophysalite, Sweden, 2s. to 6s.
Pyrosklerite, Elba, 2s. to 4s.
Pyrosmalite, Sweden, 10s. to £2.
Quarz Crystals, Saxony, &c., 1s. to 4s.
Realgar, Hungary, 3s. to 12s.
Red Antimony, Saxony, 2s. to 6s.
— Cobalt, Saxony, 2s. to 6s.
— Copper Ore, Cornwall, Siberia, 2s. to 12s.
— Hæmatite, Saxony, &c., 1s. to 2s.
— Oxide of Zinc, America, 2s. to 4s.
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Rhætizite, Tyrol, 1s. to 3s.
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Riacolite, Vesuvius, Rhine, 1s. to 4s.
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Romanzowite, Finland, 2s. to 4s.
Rose Quarz, Bavaria, 1s. to 4s.
Rubellane, Bohemia, Vessuvius, 1s. to 3s.
Rubellite, Elba, 2s. to £2.
Ruby Silver, Saxony, Harz, 2s. to £1.
Rutil, Norway, Alps, Saxony, 1s. to 6s.
Sahlite, Sweden, Bavaria, 1s. to 3s.
Sal Ammoniac, Vesuvius, 1s. to 3s.
Sapphire, India, America, 4s. to £3.
Sapphire Quarz, Salzburg, 1s. to 4s.
Sarcolite, Vesuvius, 3s. to 6s.
Saponite, Sweden, 1s. to 2s.
Sassolin, Italy, 1s. to 2s.
Saussurite, Switzerland, 1s. to 3s.
Scaly Talc, Sweden, 1s. to 3s.
Scapolite, Sweden, Norway, 1s. to 6s.
Scarbroite, Yorkshire, 1s. to 3s.
Scheelite, Saxony, 1s. to 4s.
Scheererite, Switzerland, 2s. to 4s.
Schieferspar, Saxony, 1s. to 2s.
Schillerspar, Harz, 1s. to 2s.
Schorl, Saxony, Bavaria, Norway, 1s. to 8s.
Scorodite, Saxony, 8s. to 10s.
Selenite, Harz, Alps, &c., 1s. to 4s.
Seleniuret of Lead, Harz, 2s. to 8s.
——— of Lead and Mercury, Harz, 2s. to 8s.
——— of Mercury, Mexico, 4s. to 12s.
Semiopal, Hungary, Rhine, &c., 1s. to 3s.
Serpentine, Saxony, Alps, &c., 1s. to 2s.
Siliceous Sinter, Iceland, 2s. to 4s.
Sillimanite, N. America, 3s. to 6s.
Silver, glance, Saxony, Hungary, 3s. to £2.
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Smaragdite, Bavaria, Alps, 1s. to 3s.
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Stilpnomelan, Moravia, 2s. to 6s.
Stilpnosiderite, Hungary, &c., 1s. to 3s.
Strigisan, Saxony, 1s. to 4s.
Strontianite, Scotland, Harz, Saxony, 2s. to 6s.
Succinite, Baltic, 1s. to 4s.
Sulphate of Copper, Rhine, 1s. to 3s.
——— of Iron, Saxony, 1s. to 2s.
——— of Lead, Rhine, Anglesea, 2s. to 8s.
Sulphur, Sicily, Poland, 1s. to 6s.
Sulphuret of Bismuth, Saxony, 2s. to 4s.
——— of Cobalt, Sweden, 2s. to 6s.
——— Copper, Cornwall, Harz, 2s. to 10s.
——— Manganese, Hungary, 2s. to 6s.
——— Silver, Saxony, Hungary, 2s. to £2.
——— Tin, Cornwall, 2s. to 6s.
——— Zinc, Cumberland, Hungary, &c., 1s. to 4s.
Supersulphuret of Lead, Cumberland, 2s. to 4s.
Surturbrand, Iceland, 1s. to 2s.
Swimstone (Quarz), France, 1s. to 2s.
Symplesite, Saxony, 3s. to 6s.
Tabular Spar, Hungary, Sweden, Vesuvius, 1s. to 4s.
Tachylite, Hessia, 1s. to 2s.
Talc, Alps, Saxony, 1s. to 2s.
Tantalite, N. America, Bavaria, Sweden, 3s. to 12s.
Tellur, foliated, Transylvania, 4s. to £1.
——, graphic, ditto 4s. to £1.
——, native, ditto £1 to £2.
——, silver, Siberia, 10s. to £2.
Telluric Bismuth, Hungary, 3s. to 10s.
Tennantite, Cornwall, 3s. to 10s.
Tetartine, Silesia, Alps, 1s. to 3s.
Tharandite, Saxony, 1s. to 3s.
Thomsonite, Scotland, Vesuvius, 3s. to 10s.
Thulite, Norway, Tyrol, 3s. to 12s.
Tinstone, Bohemia, Saxony, Cornwall, 2s. to 12s.
Tincal, Thibet, 1s. to 2s.
Titaniferous Iron, Norway, Saxony, 1s. to 3s.
Topaz, Saxony, Siberia, Ireland, 1s. to 10s.
Topazolite, Bavaria, Piedmont, 2s. to 6s.
Tourmaline, common black, Norway, &c., 1s. to 10s.
———, noble-coloured, Elba, America, &c., 3s. to £4.
Tremolite, Alps, Bavaria, Sweden, 1s. to 4s.
Triclasite, Sweden, 2s. to 8s.
Triphylline, Bavaria, 2s. to 6s.
Triplite, Bavaria, 2s. to 6s.
Tungstate of Iron, Bohemia, 1s. to 3s.
——— of Lead, Bohemia, 3s. to 6s.
——— of Lime, Bohemia, 1s. to 3s.
Turquoise, Silesia, Persia, 2s. to 6s.
Uran Mica, Cornwall, Saxony, 1s. to 10s.
—— Ochre, Saxony, Bohemia, 1s. to 3s.
Uwarowite, Siberia, £1 to £3.
Vanadiate of Lead, Scotland, 4s. to £1.
Vanadium Ironstone, Sweden, 2s. to 3s.
Variscite, Saxony, 2s. to 4s.
Vauquelinite, Siberia, 4s. to 10s.
Vesuvian, Vesuvius, Norway, &c., 1s. to 10s.
Vivianite, Bavaria, 2s. to 6s.
Wad, Rhine, Thuringia, 2s. to 4s.
Wavellite, Saxony, Bohemia, 1s. to 6s.
Websterite, Sussex, 1s. to 4s.
Weissgultig Silver Ore, Saxony, 6s. to £2.
Wernerite, Finland, Norway, 2s. to 8s.
Wichtyne, Russia, 3s. to 6s.
Willemine, Rhine, 2s. to 6s.
Withamite, Scotland, 2s. to 6s.
Witherite, Cumberland, 1s. to 10s.
White Antimony, Saxony, Bohemia, 3s. to 10s.
—— Cobalt, Saxony, 2s. to 6s.
—— Copper, Saxony, 4s. to 10s.
Wolfram, Bohemia, 1s. to 3s.
Wolnyne, Hungary, 1s. to 3s.
Wollastonite, Hungary, Sweden, &c., 1s. to 4s.
Wood Opal, Hungary, 1s. to 3s.
—— Tin, Cornwall, 1s. to 3s.
—— Arseniate of Copper, Cornwall, 3s. to 10s.
Yttrocerite, Sweden, 3s. to 16s.
Yttrotantalite, Sweden, 3s. to 12s.
Zeagonite, Vesuvius, 1s. to 6s.
Zinkenite, Harz, 2s. to 8s.
Zinnabar, Carinthia, Rhine, &c., 1s. to 10s.
Zircon, Norway, Siberia, 2s. to 12s.
Zoisite, Bavaria, Tyrol, 1s. to 3s.
Zunder Ore, Harz, 1s. to 3s.
Zurlite, Vesuvius, 3s. to 6s.

Minerals for Chemical Purposes,
per lb. of 16 oz.

Allanite, 12s. per pound.
Antimony (Sulphuret of), native, 1s. per pound.
Barytes (Sulphate of), 2d. per pound.
——— (Carbonate of), 1s. 6d. per pound.
Beryll, 3s. per pound.
Bismuth, native, 2s. per pound.
Blende (Sulphuret of Zinc), 6d. per pound.
Cadmiferous Blende, 2s. per pound.
Calamine, 6d. per pound.
Chromate of Iron, 6d. per pound.
Cerite, 4s. per pound.
Cobalt (Arseniate of), 3s. per pound.
——— Sulphuret, 8s. per pound.
Fluor Spar, 4d. per pound.
Gadolinite, 30s. per ounce.
Galena, 1s. per pound.
Honey Stone, 25s. per ounce.
Hyacinth, 4s. per ounce.
Iridium Osmium, 18s. per ounce.
Kaolin, 1s. per pound.
Lepidolite, 1s. 6d. per pound.
Loadstone (native), 2s. per pound.
Magnesite, 6d. per pound.
Manganese (gray), 6d. per pound.
Molybdenum (Sulphuret of), 5s. per pound.
Molybdate of Lead, 6s. per pound.
Nickel Antimony, 2s. per pound.
——— Arseniate, 2s. per pound.
Oligoklas, 1s. 6d. per pound.
Platinum, 18s. per ounce.
Petalite, 2s. per pound.
Rutil, 4s. per pound.
Scheelite (Tungstate of Lime), 1s. 6d. per ounce.
Seleniuret of Lead, 6s. per ounce.
Strontianite, Sulphate of, Saxony, 1s. 6d. per pound.
Talk, 1s. per pound.
Tantalite, Bavaria, 6s. per ounce.
Tellurium, foliated, 12s. per ounce.
Tin (Oxide of), 4s. per pound.
Titaniferous Iron, 1s. 6d. per pound.
Triphyllin, 5s. per pound.
Uranoxydul, 2s. per pound.
Wolfram (Tungstate of Iron), 9d. per pound.
Yttrotantalite, 30s. per ounce.

Specimens of Rocks.

The prices differ according to the size; three inches and four inches in length and breadth.

(Smaller size, one inch to two inches, threepence each.)

Alabaster (Gypsum), Harz, Tuscany, 6d. to 1s.
Albite Syenite, Saxony, 6d. to 1s.
Alp Limestone, Alps, 6d. to 1s.
— Sandstone, Alps, 6d. to 1s.
Alum Rock, Hungary, Italy, 1s. to 2s.
—— Slate, Saxony, 6d. to 1s.
Amygdaloidal Stone, Silesia, Rhine, 6d. to 1s.
Anagenite, Silesia, 6d. to 1s.
Anamesite, Silesia, Hessia, 6d. to 1s.
Antophyllit Rock, Bavaria, 6d. to 1s.
Anthracite, Wales, Saxony, &c., 6d. to 1s.
Appennine Sand and Limestone, Tuscany, 6d. to 1s.
Aphanite, Harz, 6d. to 1s.
Argillophyre (Clay Porphyry), Saxony, 6d. to 1s.
Ashes (volcanic), Vesuvius, 6d. to 1s.
——— (neptunic), Mannsfeld, 6d. to 1s.
Augitic Lava, Sicily, Iceland, 6d. to 1s.
——— Porphyry, Harz, Tyrol, &c., 6d. to 1s.
Augite Rock (Lherzolite), Pyrenees, 1s. to 1s. 6d.
Basalt, Saxony, Bohemia, &c., 6d. to 1s.
——— Conglomerate, Hessia, 6d. to 1s.
Basaltite, Silesia, 6d. to 1s.
Bath Oolite, Wiltshire, 6d. to 1s.
Belemnites, Schiste of the Lias, Bavaria, York, 6d. to 1s.
Bog Iron Ore, Saxony, 6d. to 1s.
Bombes (volcanic), Vesuvius, 1s.
Breccia of Bones, Bavaria, France, 6d. to 1s.
Brown Coal, Bohemia, Saxony, 6d. to 1s.
Calcareous Grit, Yorkshire, 6d. to 1s.
——— Tuff, Saxony, Rome, 6d. to 1s.
Cerithia Limestone (tertiary), Middle Rhine, 6d. to 1s.
Chalk, Kent, Ruegen, 6d. to 1s.
——— Marl, Saxony, 6d. to 1s.
———, chloritic, France, 6d. to 1s.
Chiastolite Slate, Bavaria, 2s. to 6s.
Chlorite Slate, Saxony, Tyrol, 6d. to 1s.
Cipoline Marble, Hungary and Italy, 6d. to 1s.
Clay Slate, Saxony, Harz, &c., 6d. to 1s.
Clay Stone, Saxony, 6d. to 1s.
Clymenia Limestone, Bavaria, Silesia, 6d. to 1s.
Copper Slate, Harz, 6d. to 1s.
Coralrag, Bavaria, Yorkshire, 6d. to 1s.
Cornbrash, Yorkshire, Dorsetshire, 6d. to 1s.
Crag, Suffolk, 6d. to 1s.
Cypris Limestone (tertiary), Auvergne, 1s. to 1s. 6d.
Cytherine Slate (Silurian), Nassau, 6d. to 1s.
Diorite, Saxony, Harz, &c., 6d. to 1s.
——— Porphyry, Bavaria, Harz, 6d. to 1s.
——— Slate, Saxony, 6d. to 1s.
Dolerite, Hessia, 6d. to 1s.
Dolerite Amygdaloidal Stone, Rhine, Silesia, 6d. to 1s.
Dolomite, Harz, Saxony, &c., 6d. to 1s.

Dudley Slabs, Dudley, 1*s.* to 4*s.*
Earth Coal, Harz, 6*d.* to 1*s.*
—— Slags, Bohemia, 6*d.* to 1*s.*
Eklogite, Bavaria, Styria, 6*d.* to 1*s.*
Encrinite Limestone, Bavaria, Leicester, 6*d.* to 1*s.*
Epidot Rock, Bohemia, Norway, 1*s.* to 1*s.* 6*d.*
Erlan Rock, Saxony, 1*s.* to 1*s.* 6*d.*
Erratic Blocks, Mark, Brandenburg, &c., 6*d.* to 1*s.*
Eurit Porphyry, Bohemia, 6*d.* to 1*s.*
Feldspath Porphyry, Saxony, Sweden, 6*d.* to 1*s.*
Flint, Kent, Sweden, &c., 6*d.* to 1*s.*
Freshwater Gypsum, France, 6*d.* to 1*s.*
———— Limestone, Bohemia, France, 6*d.* to 1*s.*
———— Quarz, Bohemia, 6*d.* to 1*s.*
Fuller's Earth, Saxony, Hampshire, 6*d.* to 1*s.*
Gabbro, Silesia, Harz, 6*d.* to 1*s.*
Garnet Rock, Saxony, Tyrol, 1*s.* to 1*s.* 6*d.*
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Gneiss, Saxony, 6*d.* to 1*s.*
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Granite, Silesia, Saxony, Scotland, 6*d.* to 1*s.*
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Infusorian Rocks, different localities, 6*d.* to 1*s.*
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—— Oolite, Wirtemberg, 6*d.* to 1*s.*
—— Roestone, Wirtemberg, 6*d.* to 1*s.*
—— Sandstone, Saxony, &c., 6*d.* to 1*s.*
Jura Dolomite, Bavaria, 6*d.* to 1*s.*
—— Limestone, Bavaria, 6*d.* to 1*s.*
—— Sandstone, Bavaria, 6*d.* to 1*s.*
Karpathen Sandstone (cretaceous), Austria, 6*d.* to 1*s.*
~~Kelloway Rock, Yorkshire, 6*d.* to 1*s.*~~
Keratit Porphyry, Bohemia, 6*d.* to 1*s.*
Keuper Clay, Bavaria, 6*d.* to 1*s.*
——— Dolomite, Bavaria, 6*d.* to 1*s.*
——— Gypsum, Bavaria, 6*d.* to 1*s.*
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London Clay, London, 6*d.* to 1*s.*
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Macigno, Florence, 6*d.* to 1*s.*
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Magnetic Ironsand, Saxony, 6*d.* to 1*s.*
Marine Lime and Sandstone, Italy, 6*d.* to 1*s.*
Mountain Limestone, Ireland, Lancashire, Rhine, 6*d.* to 1*s.*
Meulière, Paris, 6*d.* to 1*s.*
Mica Slate, Saxony, Alps, 6*d.* to 1*s.*
Miliolite Limestone, Paris, 6*d.* to 1*s.*
Millstone Grit, Saxony, Northumberland, 6*d.* to 1*s.*
——— Porphyry, Hungary, 1*s.* to 1*s.* 6*d.*
Molasse, Switzerland, 6*d.* to 1*s.*
Monotis Limestone, Bavaria, 6*d.* to 1*s.*
Moor Coal (Brown Coal), Bohemia, 6*d.* to 1*s.*
Muschelkalk, Bavaria, Mark, &c., 6*d.* to 1*s.*
Nagelfluhe (tertiary), Switzerland, 6*d.* to 1*s.*
Nepheline Rock, Saxony, Hessia, 1*s.* to 1*s.* 6*d.*

New Red Sandstone, Harz, Baden, Cheshire, 6*d.* to 1*s.*
Nummulite Limestone, France, 6*d.* to 1*s.*
Obsidian Rock, Italy, Ireland, 1*s.* to 1*s.* 6*d.*
——— Porphyry, Ireland, 1*s.* to 1*s.* 6*d.*
Olibano (volcanic), Naples, 6*d.* to 1*s.*
Oolite, see Jura.
Orthoceratite Limestone, Sweden, Bavaria, 6*d.* to 1*s.*
Oxford Clay, Oxfordshire, Bavaria, 6*d.* to 1*s.*
Paulite Rock, Saxony, Italy, 6*d.* to 1*s.*
Pausilipp Tuff, Naples, 6*d.* to 1*s.*
Peperino, Italy, 6*d.* to 1*s.*
Pea Ore (Iron Ore of Oolite), Bavaria, 6*d.* to 1*s.*
Pearlstone, Hungary, Italy, 6*d.* to 1*s.*
Phonolite, Bohemia, 6*d.* to 1*s.*
Piperno, Naples, 6*d.* to 1*s.*
Pisolite Limestone, Paris, 6*d.* to 1*s.*
Pitch Stone, Saxony, Scotland, 6*d.* to 1*s.*
Plæner (cretaceous), Saxony, 6*d.* to 1*s.*
Plastic Clay, Paris, Bohemia, 6*d.* to 1*s.*
Polishing Slate (Infusoria), Bohemia, Hessia, 6*d.* [to 1*s.*
Porcelain Jasper, Bohemia, 6*d.* to 1*s.*
Porphyry, in great variety, 6*d.* to 1*s.*
Portland Oolite, Dorsetshire, 6*d.* to 1*s.*
Posidonia Slate of Silurian and Lias, Rhine, Bavaria, 6*d.* to 1*s.*
Protogyne, Alps, Bavaria, 1*s.* to 1*s.* 6*d.*
Pumice, Italy, 6*d.* to 1*s.*
Purbeck Sand and Limestone, Dorsetsh., 6*d.* to 1*s.*
Puzzolan Earth, Naples, 6*d.* to 1*s.*
Pyromeride, Corsica, 1*s.* to 3*s.*
Quadersandstein (cretaceous), Saxony, 6*d.* to 1*s.*
Quarz Conglomerate, Silesia, 6*d.* to 1*s.*
——— Rock, Saxony, 6*d.* to 1*s.*
——— Slate, Saxony, 6*d.* to 1*s.*
Raseneisenstein (Bog-iron Ore), Saxony, 6*d.* to 1*s.*
Rock Salt, Alps, Wirtemberg, 6*d.* to 1*s.*
Roestone (New Red Sandstone), Harz, 6*d.* to 1*s.*
Saliferous Clay, Wirtemberg, Alps, &c., 6*d.* to 1*s.*
Schaalstein, Harz, Nassau, 6*d.* to 1*s.*
Schorl Rock and Slate, Saxony, 6*d.* to 1*s.*
Silurian Rocks, Germany, England, Sweden, Russia, 6*d.* to 1*s.*
Speeton Clay, Yorkshire, 6*d.* to 1*s.*
Spilite, Harz, 6*d.* to 1*s.*
Stilolite Limestone (Muschelkalk), Mark, 6*d.* to 1*s.*
Syenite, Saxony, 6*d.* to 1*s.*
Talk Schiste, Alps, 6*d.* to 1*s.*
Tegel (tertiary), Vienna, 6*d.* to 1*s.*
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Trachyte, Rhine, Italy, 6*d.* to 1*s.*
Trachytic Tuff, Rhine, 6*d.* to 1*s.*
Variolite, Harz, 1*s.* to 1*s.* 6*d.*
Vosges Sandstone (New Red), France, 6*d.* to 1*s.*
Wacke, Bohemia, Saxony, 6*d.* to 1*s.*
Weald Clay, Hampshire, Saxony, 6*d.* to 1*s.*
Wenlock Limestone, Dudley, 6*d.* to 1*s.*
Wheatstone, Saxony, 6*d.* to 1*s.*
Zechstein, Harz, 6*d.* to 1*s.*
Zircon Syenite, Norway, 1*s.* to 1*s.* 6*d.*

Collections of Minerals, Rocks and Fossils

Systematically arranged from the above-named varieties, according to any published system of Mineralogy, Geology and Palæontology, most carefully named and with printed labels in English, German and French, are on hand, or may be made up at the shortest notice.

I. Collections of Minerals.

(*a*) Size 2 inches.

		£	s.
100	different specimens,	£1	4*s.*
200	... ...	2	16
300	... ...	4	10
500	... ...	9	0
1000	... ...	22	0
2000	... ...	50	0
4000	... ...	130	0

(*b*) Size 3 inches.

		£	s.
100	different specimens,	£1	18*s.*
200	... ...	4	5
300	... ...	7	10
500	... ...	15	0
1000	... ...	34	0
2000	... ...	80	0
4000	... ...	200	0

II. Collections of Rocks, with Fossils, if characteristic of the strata, arranged after De la Beche and Murchison.

(*a*) Size 3 inches.

		£	s.
100	different specimens,	£1	5*s.*
150	... ...	2	0
200	... ...	3	0
500	... ...	10	10
1000	... ...	28	0
2000	... ...	70	0

(*a*) Size 4 inches.

		£	s.
100	different specimens,	£2	0*s.*
150	... ...	3	10
200	... ...	5	10
500	... ...	18	0
1000	... ...	54	0
2000	... ...	120	0

III. Collections of Plutonic and Volcanic Rocks.

		£	s.
100	different specimens from various localities,	£1	10*s.*
200	... ...	4	0
300	... ...	7	0
400	... ...	10	0
500	... ...	14	0

IV. Collections of Tertiary Fossils, according to Lyell's arrangement, chiefly from Germany, Italy, and France.

		£	s.
100	specimens	£2	10*s.*
200	... ...	6	0
300	... ...	10	0
400	... ...	13	10
600	... ...	25	0

V. Collections of Upper Secondary Fossils of the Continent (chiefly from the Chalk, Wealden, Oolite and Lias).

		£	s.
100	specimens,	£2	10*s.*
200	... ...	6	0
300	... ...	10	0
500	... ...	18	0
600	... ...	24	0
1000	... ...	60	0

VI. Collections of Middle Secondary Fossils and Rocks of the Continent (from the Keuper, Muschelkalk, and New Red Sandstone).

		£	s.
100	specimens,	£2	10*s.*
200	... ...	6	0
300	... ...	10	0

VII. Collections of Fossils from the Zechstein, Coal-Measures, Mountain Limestone, Silurian and Cambrian Rocks.

		£	s.
100	specimens,	£2	15*s.*
200	... ...	7	0
300	... ...	12	0
500	... ...	25	0

VIII. Collections of Fossils from all Formations and Fossiliferous Rocks systematically arranged according to De la Beche and Murchison.

		£	s.
100	different species,	£1	16*s.*
200	... ...	4	0
300	... ...	7	10
500	... ...	15	0
1000	... ...	34	0
2000	... ...	70	0
3000	... ...	130	0

Models of Crystals, Goniometers, Geological Hammers, Scales of Hardness, Collections for Lecturers, illustrating Colours, Fractures, Composition, &c. &c., and any other kinds of Instruments, illustrating Mineralogical and Geological Science, are either ready made or are procured at the most moderate terms.

All Packages from Berlin are sent by way of Hamburgh, at the lowest rate, through our Agent in London, Mr. Pamplin, Botanical Bookseller, Frith Street, Soho; the general charge would be, from Berlin to London, about £1 for a Hundredweight, Carriage, Custom-house Entry and Commissions included.

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to 4*s*.
1*s*. to 6*s*.
ny, 6*s*. to £2.
2*s*. to 8*s*.

Hyacinth, 4*s*. per ounce.
Iridium Osmium, 18*s*. per ounce.
Kaolin, 1*s*. per pound.
Lepidolite, 1*s*. 6*d*. per pound.
Loadstone (native), 2*s*. per pound.
Magnesite, 6*d*. per pound.
Manganese (gray), 6*d*. per pound.
Molybdenum (Sulphuret of), 5*s*. per pound.
Molybdate of Lead, 6*s*. per pound.
Nickel Antimony, 2*s*. per pound.
——— Arseniate, 2*s*. per pound.
Oligoklas, 1*s*. 6*d*. per pound.
Platinum, 18*s*. per ounce.
Petalite, 2*s*. per pound.
Rutil, 4*s*. per pound.
Scheelite (Tungstate of Lime), 1*s*. 6*d*. per ounce.
Seleniuret of Lead, 6*s*. per ounce.
Strontianite, Sulphate of, Saxony, 1*s*. 6*d*. per pound.
Talk, 1*s*. per pound.
Tantalite, Bavaria, 6*s*. per ounce.
Tellurium, foliated, 12*s*. per ounce.
Tin (Oxide of), 4*s*. per pound.
Titaniferous Iron, 1*s*. 6*d*. per pound.
Triphyllin, 5*s*. per pound.
Uranoxydul, 2*s*. per pound.
Wolfram (Tungstate of Iron), 9*d*. per pound.
Yttrotantalite, 30*s*. per ounce.

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(Smaller size, one inch to two inches, threepence each.)

Alabaster (Gypsum), Harz, Tuscany, 6*d*. to 1*s*.
Albite Syenite, Saxony, 6*d*. to 1*s*.
Alp Limestone, Alps, 6*d*. to 1*s*.
—— Sandstone, Alps, 6*d*. to 1*s*.
Alum Rock, Hungary, Italy, 1*s*. to 2*s*.
—— Slate, Saxony, 6*d*. to 1*s*.
Amygdaloidal Stone, Silesia, Rhine, 6*d*. to 1*s*.
Anagenite, Silesia, 6*d*. to 1*s*.
Anamesite, Silesia, Hessia, 6*d*. to 1*s*.
Antophyllit Rock, Bavaria, 6*d*. to 1*s*.
Anthracite, Wales, Saxony, &c., 6*d*. to 1*s*.
Appennine Sand and Limestone, Tuscany, 6*d*. to 1*s*.
Aphanite, Harz, 6*d*. to 1*s*.
Argillophyre (Clay Porphyry), Saxony, 6*d*. to 1*s*.

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XXVIII.—*Notice of a British species of* Calliopæa, *D'Orbigny, and of Four new species of* Eolis, *with observations on the Development and Structure of the Nudibranchiate Mollusca.* By Joshua Alder and Albany Hancock, Esqrs.*

The genus *Calliopæa* was established by D'Orbigny for a small mollusk found near Brest, and published in Guerin's 'Magasin de Zoologie.' It is distinguished from *Eolis* by having only two tentacula, and also (according to D'Orbigny) by the longitudinal arrangement of the dorsal papillæ. The latter distinction, however, does not hold good, and a better may be had in the arrangement of the vessels of the gastro-vascular system, described by Milne Edwards in a second species found on the shores of the Mediterranean. We have now the pleasure of announcing a third species from the Devonshire coast, being the first that has occurred in Great Britain.

This beautiful species, which we have named *Calliopæa dendritica*, is about a quarter of an inch long, with seven or eight rows of large, elliptical, dark green papillæ on each side of the back, three in each row. The general colour of the body is a pale pellucid grass-green: two dark green lines run down the sides of the back, sending off branches of the same colour, which ramify in all directions, and give the little animal a peculiarly elegant appearance. These dendritical markings are caused by the vessels of the gastro-vascular system of Milne Edwards, of which we shall have occasion to speak afterwards. It was found on sea-weeds at low-water mark in Torbay, and appears to be gregarious. Nearly one hundred specimens were sent us from thence by Mrs. Wyatt.

Eolis stipata.—This species is also from Torbay, where we obtained it from the produce of a day's dredging in September last. It is about a quarter of an inch long, rather broad and depressed, and of a bright yellowish green on the body with short tentacula, and about nine rows of bluish-green papillæ covering the whole of the back. This species belongs to the section con-

* Read before the Natural History Section at the Cork Meeting of the British Association, and communicated by the Authors.

stituting Fleming's genus *Montagua*. It differs entirely from *Montagua viridis* of Forbes in the form and proportion of the different parts.

Eolis pellucida.—A very slender and graceful species, about three-quarters of an inch in length, with long slender tentacula, and the angles of the foot much produced. The body is pellucid white: the branchial papillæ long and slightly conical, of a bright rose-vermilion with white tips, set in about five clusters down the sides. This is a critical species, differing from *E. gracilis*, noticed last year, in the form and colour of the papillæ, and from *E. rufibranchialis* in the more lengthened tentacula and lateral portions of the foot.

Found on a coralline from deep water at Cullercoats, Northumberland.

Eolis curta.—The body of this is short in proportion to the other parts. It is about half an inch long, pellucid; the head and tentacula pale rose-coloured. The branchial papillæ are very long, of a brownish orange with white tips and a streak of the same in front. They are set in clusters down the sides; the first large, and three or four smaller ones behind nearly coalescing. Dorsal tentacula annulated, sides of the foot much produced and recurved.

Found under a large stone among the rocks at Whitley, Northumberland.

Eolis concinna.—A very distinct and well-marked species; about half an inch long, with nine or ten distant transverse rows of purplish-brown papillæ, tipped with white, on the sides of the back, five in each row: the external surface of these is tinged with pale blue, giving them a metallic lustre. Tentacula linear and smooth, the dorsal longest and inclined forwards. Sides of the foot very little produced. Four individuals were found together under a large stone between tide-marks at Whitley.

We have, during this summer, had an opportunity of studying the development of the ova in two or three genera of the Nudibranchia, the phænomena attending which we find to be very similar in all. The fact of their undergoing a complete metamorphosis, and during their larva state being provided with a nautiloid shell, is a striking peculiarity distinguishing these from the other families of gasteropodous Mollusca.

We learn incidentally, in a note to an article on the development of *Aplysia* by Dr. Vanbeneden in the 'Annales des Sciences Naturelles,' that M. Sars has already published an account of the development of some of the Nudibranchia; but the work containing it not being accessible to us, we are at a loss to know how far our observations agree with his, and shall therefore give a short description of the embryo as observed by us.

The spawn of *Doris tuberculata* is a broad gelatinous riband, attached by one of its edges to the underside of stones, in a circular coil of about three volutions, the whole forming a beautiful cup- or flower-like expansion. The number of ova imbedded in it, on a moderate computation, cannot be less than 50,000. Each egg contains a single yolk, but frequently there are two, and sometimes even three yolks in the same egg. The period necessary for their attaining the larva state appears to be about a fortnight; after that time the mass presents a very animated appearance. When observed with a common magnifier, in some the full-formed larva will be seen whirling itself round with great velocity in the transparent egg; others, having broken the shell, will be found performing more extended gyrations in the general envelope, while others again are swimming hither and thither in search of an aperture to escape into the open water. The larva forms a beautiful object for the microscope. Its body is inclosed in a very transparent calcareous nautiloid shell, furnished with an equally transparent operculum. The whole surface of the animal is covered with minute vibratory cilia, as are also the internal walls of the alimentary canal, which is visible through the transparent shell. Two large wing-like lobes form the principal part of the animal visible outside the shell; these are fringed with long cilia, by the motion of which it swims freely through the water; they are capable of being withdrawn into the shell and the operculum closed upon them. The mouth is situated between these lobes. It will readily be seen that these little creatures do not bear even the most remote resemblance to the future *Doris*. How long they remain in this state before their final transformation, or how that takes place, we have not yet been able to ascertain. The motion of these animals through the water by means of ciliated expansions recalls to mind some of the forms of the Rotifera, though sufficiently distinct from any of them. Comparing our drawings with those of *Aplysia* by Vanbeneden, we observe a very striking resemblance between the two animals: each has a similarly formed shell; though that of *Aplysia* is stated to be corneous, while ours readily dissolves in weak acids, from which we infer its calcareous nature. We do not see in M. Vanbeneden's figures the expanded lobes so peculiar in these, nor, on the other hand, can we trace in any of the parts of our animals the least resemblance to a rudimentary head or foot. In addition to that of *Doris*, we have succeeded in bringing out the larvæ of *Eolis*, *Melibœa* and *Tritonia*; they all bear a very great resemblance to each other.

The system of vessels pointed out by M. Milne Edwards in *Calliopæa*, connected with the alimentary canal, and extending through the whole body, which he calls the gastro-vascular sy-

stem, has been observed also by us in *Eolis*, with this difference, that while in *Calliopæa* there are two longitudinal vessels running the whole length of the body, in *Eolis* there is only one of these vessels, sending off branches to the papillæ. The passage of particles of matter from these vessels into the papillæ and back again in an irregular manner may occasionally be observed. These particles are of various sizes and forms, and have a crude undigested appearance. They are occasionally mingled with regular blood-like globules. Their motion is produced by the contraction of the walls of the vessel and of the stomach, which is every now and then perfectly collapsed. There is no decided onward current produced by this action, which takes place quite irregularly in different parts of the gastro-vascular system, but a mere oscillatory motion in the immediate vicinity of the action. We have observed another curious circumstance apparently connected with this system, which appears to have escaped the observation of M. Milne Edwards, and for which we can in no wise account. The end of each of the papillæ has internally a small ovate vesicle, which is connected by a transparent vessel with its central tube. By the contraction of this vesicle very minute bodies are occasionally sent out by a small aperture terminating the papilla. These bodies are of an elliptical form, with a long hair-like tail, and bear considerable resemblance to the Spermatozoa, but have no motion, nor is the organ from which they issue at all connected with the generative functions. We would therefore call the attention of comparative anatomists to this fact.

The functions of the gastro-vascular system as well as of the papillæ, which have generally been considered to perform the office of branchiæ, require further investigation. M. Quatrefages appears to think that the central coloured portion of the papillæ performs the functions of the liver; an opinion which is perhaps correct, but requires further investigation.

The fact, which we do not recollect to have seen stated, that the whole surface of the body in *Eolis*, as well as the papillæ, is covered with vibratory cilia, might lead us to infer that the organs of respiration are not specialized in this genus, but that the animal breathes over the whole body. The appendages in *Eolis* as well as in *Melibœa* are very deciduous, which is not usually the case with an important vital organ, and the animals are known to live for some time when deprived of them. But even though the papillæ should be considered the chief seat of the respiratory function, it is evident that they have at least some other office to perform, the nature of which is not well understood.

Dr. Siebold has announced the discovery of the organs of hearing in many of the pulmoniferous Gasteropodes as well as in se-

veral species of Conchifera*. We have lately had the pleasure of recognising the same organs in the Nudibranchia; they consist of two transparent vesicles connected with the two superior lobes of the brain by short nerves. These vesicles are filled with small concrete bodies or otolites, varying in number according to the species, and vibrating, when in a living state, with a continuous oscillatory motion.

In *Eolis papillosa* the otolites exceed eighty; they are elliptical and very minute; while in *E. olivacea* and *E. pallida* there is only one large globular otolite in each capsule. We have observed these organs in species of the genera *Eolis, Tritonia, Melibœa, Polycera* and *Doris*; in all of which we find them similarly situated and undergoing only very slight modifications.

The eyes are placed immediately before the auditory capsules, and the nerve that supplies the former arises from the same portion of the large ganglion above the œsophagus to which the latter is affixed. The eye is much more completely organized than has been supposed; it is formed of a well-defined cup of black pigment, through which in all probability the retina is dispersed. Before this cup is placed a large spherical crystalline lens, having a well-arched cornea in front. The whole is enveloped in a thin transparent vesicle attached to the ganglion by a pedicle, through which the optic nerve passes into the base of the cup.

The organs of smelling remain yet to be ascertained. De Blainville has suggested that this function may be performed by the dorsal tentacula, and a careful examination of the structure of these compared with that of the olfactory organs in other animals has led us to adopt the same opinion. The simplest form in which the organs of smelling are known to exist, is in fishes and in some of the Crustacea. If we examine this organ in a fish, the common herring for instance, we shall find it to consist of a delicately lamellated expansion contained within a cavity, open externally, but closed on its internal surface, and communicating with the brain by a nerve having a small ganglion at its base. Now if this lamellated portion were bent into a cylindrical form and raised upon a pedicel capable of being protruded from the cavity, we should have a structure exactly similar to the dorsal tentacula in *Doris*. It is easy to trace the modifications of this form through the other genera of the order, in most of which the plicated structure is more or less visible, the organ being in some carefully protected by a sheath. In all, the tentacula are furnished with a nerve which generally has a small ganglion at its base, as in the olfactory nerve in fishes. On examining the tentacula under a microscope, the whole surface is found to be very strongly ciliated; more strongly even than in the branchial

* See this Journal, vol. ix. p. 501.—Ed.

processes, and with this remarkable difference; that while in the latter the cilia propel the water outwards, sending off a current at their apices; in the tentacula, on the contrary, the cilia are directed downwards, drawing in and sending a current of water down their whole surface. This is exactly what we might be led to expect in the olfactory organs, and forms a beautiful compensation for the power of drawing a current of air through the nostrils in the higher animals. Upon the whole, therefore, we think that little doubt can remain of the real function of these organs.

P.S. Since writing the above, we have seen M. Quatrefages' elaborate paper on his *Eolidina paradoxum* in the 'Annales des Sciences Naturelles,' and are happy to find that many of his observations agree with our own. His *Eolidina* we consider to be undoubtedly an *Eolis* very nearly allied to our *E. angulata*, MS., communicated to the last meeting of the Association.

In the position which he assigns to the anus at the posterior end of the large central vessel of the gastro-vascular system, we conceive him to be under a mistake, deceived probably by the apparently abrupt termination of that vessel. The real anus, we have no doubt, will be found at the side, as in other species of this and the allied genera.

He appears also to have misunderstood the organs of vision, which, it can scarcely be doubted, are as complete as in other species of *Eolis*, as well as in *Polycera*, *Goniodoris* and *Melibœa*, in all of which a lens is distinctly visible; he however figures and describes the eye in his *Eolidina* as merely a broad convex expansion of the retina and pigmentum nigrum. It would appear from his drawing that he has mistaken the auditory capsule for the optic ganglion or a swelling of the optic nerve, otherwise he has entirely overlooked the organ of hearing. His description of the generative organs is quite at variance with the well-known peculiarities of this order.

M. Quatrefages' remarks on zoological affinities are ingenious: on this interesting portion of the subject however we cannot at present enter, but hope to do so on a future occasion, when a further investigation of the subject shall have enabled us to speak with more certainty than we can possibly do at present.

XXIX.—*On the Structure and Affinities of* Upupa, *Lin.*, *and* Irrisor, *Lesson.* By H. E. Strickland, M.A.*

The African continent presents us with several species of birds constituting a well-marked genus, to which Lesson in 1831 ap-

* Read to the Zoological Section of the British Association at Cork, August 19, 1843; and communicated by the Author.

plied the name *Irrisor*, being a translation of Levaillant's name "*Moqueur*." This group of birds was included by Latham in the genus *Upupa*, by Shaw in *Promerops*, by Vieillot in *Falcinellus*, by Cuvier in *Merops*, and by Temminck and Wagler in *Epimachus*; but as they differ essentially from the types of all these genera, it is necessary to give them a distinct appellation. Mr. Swainson, Mr. Vigors, the Baron de la Fresnaye, and Mr. G. R. Gray restrict to this group the name *Promerops* of Brisson; but Brisson was wholly unacquainted with the group before us, and the true type of his genus *Promerops* is a totally different bird, called by Vieillot *Falcinellus*, and by Swainson *Ptiloturus*. It is plain then that the right course is to supplant *Falcinellus* and *Ptiloturus* in favour of the old generic name *Promerops*, and to adopt for the present group the name *Irrisor* as proposed by M. Lesson.

Having now settled the nomenclature of this group, I will proceed to speak of its affinities, and to show first its relation to the genus *Upupa*; and secondly, its position in the general system of Nature.

It should be premised that the genera *Upupa* and *Irrisor* agree in the form of the beak, but differ in many other particulars. In *Upupa* the plumage is ferruginous, varied with white and black; the head is crested; the tail moderate and even, composed of ten rectrices; the feet adapted for walking; the lateral toes being nearly equal, the exterior ones divided nearly to their base; the anterior claws short and blunt, and the hinder claw lengthened and approaching to straightness. In *Irrisor*, on the contrary, the plumage is black with rich metallic tints, varied only with a few white spots on the wings and tail; the head is not crested; the tail is long and much graduated, composed of twelve rectrices, and the feet are essentially arboreal, the outer toe being much longer than the inner, and united to the middle one for the whole length of the basal joint; the hind toe is very long, and all the claws are compressed, sharp, and much curved. It is evident, therefore, that these birds must differ greatly in their habits; and accordingly we find that the hoopoe lives chiefly on the ground, while the *Irrisor* is described by Levaillant as exclusively inhabiting trees. The question then arises, whether the agreement in the form of their beaks is to preponderate over the disagreements of their other organs; in other words, whether this resemblance in the beaks is to be considered as indicating an affinity or only an analogy.

The majority of authors have classed the Irrisors either amongst or very near the Hoopoes. But the Baron de la Fresnaye, in the 'Proc. of the Zool. Soc.' for 1840*, p. 124, contends that the ge-

* See Ann. Nat. Hist., vol. vii. p. 551.—Ed.

nera *Upupa* and *Irrisor* (or as he terms it, *Promerops*,) have in reality no near affinity to each other. He argues that birds have in many cases been arranged artificially in consequence of authors being guided solely by the form of the beak without attending to the structure of the other organs. After pointing out the marked differences between the feet of *Upupa* and those of *Irrisor*, he concludes that *Upupa* has evident affinities with the larks (*Alaudinæ*), but that its true position is in a special family of the *Tenuirostres*, in conjunction with *Upucerthia* and some other allied S. American genera. The genus *Irrisor*, on the contrary, he considers to belong to the *Cinnyridæ*, or as they are more correctly called, *Nectariniidæ*, to which they have much resemblance in their glossy plumage.

Now it is undoubtedly true that the most unnatural classifications of birds have in many cases resulted from the beak being taken as the sole ground of arrangement, to the exclusion of the other organs. I do not however think that the juxtaposition of *Upupa* and *Irrisor* is really an instance of such a vicious arrangement, and I hope to show, that notwithstanding the disagreements in their feet, tail and plumage, these two genera are in reality very closely allied.

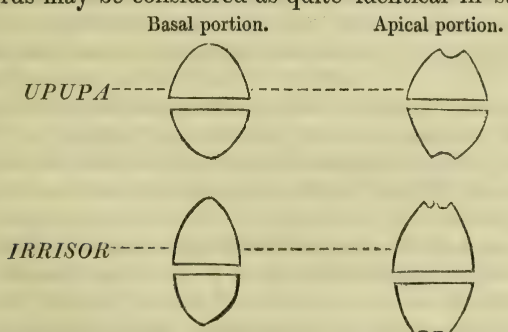
It will generally be found that when several genera of remote affinity have been brought together in consequence of a resemblance in the form of their beaks, that resemblance is more apparent than real, consisting in a general and superficial agreement in the form and outline, while the minor details of structure present differences which at once indicate the true affinities of the respective groups. Thus the genus *Scythrops* was till very lately classed by all authors among the toucans, on account of the general resemblance of the beak, while if the slightest attention had been paid to the position of the nostrils, it would have been seen at once that its true place is among the cuckoos. A similar superficial resemblance in the beak has caused *Tichodroma* to be classed with *Certhia* instead of with *Sitta*, *Spermophila* with *Pyrrhula* instead of with *Guiraca*, *Oreoïca* and *Falcunculus* among the *Laniinæ* instead of the *Parinæ*, and numerous other cases which might be quoted.

On comparing *Upupa* with *Irrisor*, however, we find a coincidence of structure not only in the general forms, but in the minutest details of the structure of their beaks ; and what is of still greater importance, the beaks of these two birds present certain characters which are found in no other group of birds with which I am acquainted.

Upupa and *Irrisor* both present to us the remarkable combination of a very long beak with a very short tongue. The two mandibles are for three-quarters of their length perfectly solid, the surfaces of contact being smooth and flat; while in all other

long-billed birds the interior of both mandibles is provided with a hollow space for the reception and action of a lengthened tongue, or for the temporary retention of their food. This very remarkable and peculiar structure has been noticed by no author (as far I am aware) except Wagler, who in his definitions of *Upupa* and *Epimachus*, in which last genus he includes *Irrisor*, notices this character, but without making any comment on its singularity. It is sufficiently evident from this structure that both *Upupa* and *Irrisor* have very little affinity to the *Tenuirostres*, in which the tongue is remarkably lengthened and adapted to the purposes of suction, and *Irrisor* cannot therefore be referred to the *Nectariniidæ*, as supposed by the Baron de la Fresnaye. The fact is, that the beaks of these birds are not constructed for *suction* but for *probing*, i. e. for reaching into deep holes and crevices in quest of the larvæ of insects. We know that the hoopoe obtains its food by inserting its beak into the holes made in the ground by coprophagous insects, and it is probable that the *Irrisor* feeds in a similar manner upon the larvæ which perforate decayed trees.

The beaks of these two genera of birds present another character unnoticed by all previous authors, and, like the former one, believed to be peculiar to these two genera alone. The basal and medial portion of the ridge of both mandibles is obtusely and roundedly carinate, but in proceeding towards the apex, the ridge first becomes flattened, then hollowed, and at last deeply grooved. In the *Irrisor* this flattened portion commences in both mandibles about the middle of the beak, and soon changes into a flat-bottomed groove, which towards the apex is divided into two by a fine intermediate ridge. In *Upupa* the flat space commences about two-thirds of the total length from the base, and wants the intermediate ridge. With these slight differences the beaks of the two birds may be considered as quite identical in structure,



while they differ as before remarked from those of all other known birds. These characters are shown in the above figures, which represent magnified transverse sections of the mandibles.

This peculiar coincidence of structure must, I submit, be considered to indicate something more than mere analogy, and rather to show that *Upupa* and *Irrisor* form two subdivisions of the same superior group; or in other words, that they have more affinity to each other than either of them has to any other group which it may resemble.

Nor are the points of mutual agreement in these two genera wholly confined to the structure of the beak. Considerable as their differences undoubtedly are, yet they are not overpoweringly so. They both nidificate in hollow trees. The wings in both are similarly formed, the quills being much graduated, and the fourth and fifth longest. The differences in the style of colouring are not greater than we often meet with in genera of the same subfamily, while the large patches of white on the remiges and rectrices of *Upupa* have their counterparts on the same feathers of *Irrisor*. The differences in the form of their tails is a character admitted to be only of *generic*, and in some genera only of *specific* importance. The most weighty distinction is undoubtedly to be found in the structure of their feet, but this is not greater than will be found in the feet of many terrestrial genera when compared with the arboreal forms of the same families. If we look at the feet of ground-cuckoos, ground-woodpeckers, ground-parrots, or ground-pigeons, we shall find that in every case these members are specially modified to suit the habits of the bird, yet this modification of the feet does not blind us to the true affinities of the species which exhibit it.

It may be said, that in the present case the evidence of the feet neutralizes that of the beak, and renders it indifferent which way we decide the question. But this is not a correct view of the case, because neither the feet of *Upupa* nor of *Irrisor* present any peculiar and unique structure, such as we see in the beaks of both; they only exhibit a slight modification of the same organs adapted for special modes of life, and such as are to be met with in many other instances of genera belonging to one and the same subfamily.

I conclude, therefore, that the true and natural series of affinities will be most correctly exhibited by preserving *Upupa* and *Irrisor* in juxtaposition, and by including them both in the family *Upupidæ*, which may be divided into two subfamilies, *Upupinæ* and *Irrisorinæ*.

We now come to a more difficult question, viz. what is the position of the *Upupidæ* with respect to the other families of birds? They certainly are a very insulated group, forming what in geology would be termed a *remote outlier*, and it is not easy to say to which of the more continental masses they most nearly approximate. Guided by the elongation of the beak, the majority of authors have placed them unhesitatingly among the *Tenuirostres*

or suctorial birds; but the latter are distinguished by the length of the tongue no less than by that of the beak, and this arrangement cannot therefore be called a natural one. Baron de la Fresnaye, while retaining both *Irrisor* and *Upupa* among the *Tenuirostres*, connects the latter with *Upucerthia* and its allied genera (*Cinclodes, Geositta, Limnornis* and *Furnarius*). But these last are merely a subfamily of the great S. American family *Certhiidæ*, modified in accordance with their terrestrial habits, and the resemblance which they bear to *Upupa* is very remote, and seems to be one of analogy only.

Where then are the *Upupidæ* to be placed? This question cannot I think be answered satisfactorily till more facts are collected respecting the food, habits and anatomy of this group and of others with which it may be compared. It may however be conjectured that they are allied in one direction by means of *Epimachus* or *Astrapia* to the *Paradiseidæ*, and in another by *Merops* to the *Alcedinidæ*, as shown in 'Ann. Nat. Hist.,' vol. vi. plate 8, and as originally suggested by Mr. Vigors in 'Linn. Trans.,' vol. xiv. p. 466. In a third direction they are perhaps connected through *Lamprotornis* with the *Corvidæ*.

XXX.—*Upon the Anatomy of* Phalangium Opilio (*Latr.*). By Alfred Tulk, M.R.C.S., M.E.S.

[Continued from p. 165.]

[With a Plate.]

Internal Anatomy.—*Muscular System.*—As might be anticipated from the disproportionate length and slenderness of the extremities, as contrasted with the body in *Phalangium*, and that the latter is elevated and balanced between them during rapid flight, when the creature has often to make its way over an irregular surface of stones and herbage, the muscles required for such exertions are of large size, and constitute by far the most important portion of the class of organs to which they belong. They consist of numerous strong fasciculi, which arise from the interior of the coxal joints, and pass forwards, filling up the latter cavities almost completely, and are inserted into the trochanter. The transverse striæ upon them are remarkably distinct and well-defined, and the ultimate fibrils of considerable size, as both the one and the other may be seen under a magnifying power of between thirty and forty linear. The sarcolemma investing them may be also perceived, either raised occasionally from their surface, or connecting their extremities when torn across. The succeeding joints of the legs are too small to admit of the precise distribution of the flexors and extensors being traced, but by sepa-

rating them carefully at their articulations, the muscular fibre is observed to be continued from one to the other, as far as the distal end of the second portion of the tibia, where two long and delicate tendons are given off, which traverse the entire series of tarsal joints, running along their under surface. The chief muscles of the cheliceræ and palpi consist of an elevator and depressor for each of these organs, the latter being somewhat the larger of the two. The remaining fasciculi, connected with the other organs of manducation, are too minute to admit of any satisfactory demonstration. Pl. III. fig. 12. * *, however, represents a pair of these, attached to the margins of the second pair of jaws. The other muscles of *Phalangium*, as connected with the performance of some special functions, will be considered in speaking of those structures of which they form a part. I have already alluded to the probable use of the longitudinal and oblique fibres of the corium, that they may serve, in other words, to diminish the bulk of the animal's body, more especially that of the abdominal cavity, which must be necessary to aid in the expulsion of the fæces, the extrusion of the ova, or of the external generative apparatus in both sexes.

Organs of Nutrition.—Like the alimentary canal of the true Spiders and of the *Scorpionidæ*, that of the *Phalangia* consists of a straight intestine passing from one extremity of the body to the other, but which, instead of being more or less narrow, as in them, throughout its entire course, dilates within the abdominal cavity, to form a wide and capacious sac, occupying nearly its whole breadth. It commences in front by a membrano-coriaceous pharynx (Pl. IV. fig. 15. *ph*), which opens externally, between the first and second pair of maxillæ, and is lodged within the concave structure, described above as the epipharynx (*ex*). Its upper surface is curved, to adapt itself to the interior of the latter, and presents in the middle an elongated horny plate (*), the anterior half of which (Pl. IV. fig. 16. *dp*) is narrow, deflexed, and constricted in front, towards the apex, where it terminates by forming a corneous lip (*l*), which is opposed to two others (*l'l'*), placed laterally and beneath it, the three nearly meeting, so as to leave a narrow and somewhat triradiate opening into the pharynx superiorly, while below them the latter expands into a wide transverse aperture (*a*). It was probably an imperfect view of the above lips, which appear but as dark spots when seen under a low power, that led Savigny† to admit the existence of two, and subsequently three pharyngeal orifices in the *Phalangia*. The posterior moiety of this plate is emarginate behind and nearly three times the width of the preceding one, and deeply grooved

† Mém. sur les Anim. sans vertèbres: Paris, 1816.

along its under surface, the sides of this groove projecting into the cavity of the pharynx, as two sharp incurved ridges. The anterior half of the plate appears also to be provided with a minute channel continuous with the above. Upon either side, and superiorly to this plate, the pharynx is raised into two longitudinal and linear ridges, which are continued, almost parallel with each other, as far as the commencement of the œsophagus, and are furnished externally with elongated conical projections, which give attachment to the tendons of numerous transversely striated muscular fasciculi, some of which pass upwards, others obliquely downwards upon the side of the pharynx. Upon each side of the pharynx is a pair of short horny teeth (Pl. IV. fig. 15. *t*) lying close to each other, and which project inwards and slightly upwards towards the posterior half of the dorsal plate. Upon their outer sides are similar ridges for the insertion of a horizontal set of muscular fibres (*m*); besides which, other muscles extend transversely (*m'*) over the pharynx, as far as its posterior termination. The pharynx is broadest in the middle, and narrows again towards the commencement of the membranous œsophagus (*œ*), which, after bending downwards from the above, passes over the thoracic ganglion and forms a slight dilatation (*d*), previous to expanding again into the large gastric sac (Pl. IV. fig. 18. G).

Connected with the above conditions of the pharyngeal tube in *Phalangium*, it is interesting to find corresponding modifications in the process by which these creatures derive their aliment. The Araneida, from the extreme minuteness of that structure and of the œsophageal canal, are enabled to live only by sucking the juices of the different insects upon which they prey. The harvest-spiders, carnivorous also in their habits, combine, however, the power of mastication with that of suction,—a double operation, which would appear to be performed in the following manner. It will have been seen, in treating of the maxillary organs, that owing to the continuity of the first pair of jaws with the margins of the epistome, and of the second pair with those of the labium, the horizontal action of these parts against each other, as in insects, must be, to a certain extent, prevented, and they work accordingly in the reverse or vertical direction, the anterior, the most moveable, playing to and fro in the concavity formed by the second pair with the lower lip, and thus crushing the food "by friction," as was observed by Treviranus. In addition to these peculiarities, the horny bow of the first maxillæ is united to the anterior part of the pharynx upon either side, so that when the muscles of the latter act they may probably stretch upon it, and thereby render tense the hollow pouches upon which it rests. By these, as by a couple of pads, the body of the captured insect may then be compressed and crushed, so as to cause the fluids, aided by the capil-

lary action of the soft hairs upon the surface of the maxillæ, to flow through the trilabiate opening into the channel of the dorsal plate of the pharynx; while the hard and solid parts, already much softened, will be received by the larger aperture into the general cavity of the latter, and undergo further trituration between its lateral pairs of teeth previous to entering the œsophagus. I state these opinions relative to their uses, as they have appeared to be deducible from the arrangement of the parts in question, it being scarcely possible, from their minuteness, to test this subject by actual observation. The reader is referred to the very interesting paper by Captain T. Hutton* upon the habits of a large species of *Galeodes*, as affording evidence that other genera of Tracheary Arachnida also devour their food whole. The harvest-spiders, at least the present species, are nocturnal in their habits, and capture their prey, consisting of flies, musquitoes, and small lepidoptera, by stealing cautiously towards it, and making a gliding spring upon the victim when within reach. Herbst† has well described their predatory actions, when he says, "Sie springen und stürzen auf die Beute, wie die Katze auf die Maus, und halten sie mit den Palpen wie mit Händen selbst." I have repeatedly seen individuals of *P. cornutum*, when in confinement, pursue each other with the utmost pertinacity, the larger generally pouncing upon the smaller, and having brought them within reach of the cheliceræ and palpi by grappling them with their long legs, proceed to devour the body, leaving the extremities untouched. They use one of their legs occasionally, to support the food to their mouth. It may be also, that the appendages to the second pair of coxal joints serve some similar purpose.

I proceed now to consider the remainder of the digestive apparatus, so remarkable from the numerous cæcal pouches which are given off from it, and which completely conceal the continuation of its canal upon the upper surface. These *cæca* may be conveniently divided, as regards their position, into those situated upon the *dorsal* surface of the canal, those upon the *ventral*, and others upon the *sides*, and, as to size, into *large* and *small* cæca. Beginning with the superior group, the first are a pair of large oblong sacs (Pl. IV. fig. 17. A A), situated one upon either side of the median line, and extending the entire length of the abdomen. They are somewhat broadest posteriorly, and occupy each about a fourth of the width of the abdominal cavity. They are attached, as are two other pairs of long cæca, to the intestine throughout their entire length, being formed, as it were, by diverticula of the coats of the latter, the edges of which, adherent,

* Annals of Nat. Hist., August 1843.

† *Op. cit.*

merely leave an opening of communication at the anterior extremity of the sacs. Between these two cæca is a groove or depression, which expands in front, and lodges the posterior division of the trilocular heart, upon either side of which, resting partly upon these cæca, is the upper pair of biliary vessels. Directly in front of these large cæca are four rows of small ones, reaching as far forwards as the anterior part of the thoracic cavity. The two anterior ($a'a'$, $b'b'$), which lie against the sides of the middle optic nerve, consist each of a pair of globular pouches; the third row, appearing to be formed of two upon either side ($c'c'$), has, in reality, only one like the preceding, but divided by a deep constriction. The fourth and last row ($d'd'$) seems also to be made up of the same number, but the double character is here due to the projection upwards of the rounded extremity of a pair of cæca (*ee*), which open into the anterior end of two long inferior sacs (Pl. IV. fig. 18. *ee*) presently to be described. Between the four posterior pouches lies the middle chamber of the heart (Pl. IV. fig. 17. H), and upon them the loop of the upper biliary tubes. The anterior division of the heart rests between the two succeeding pairs. Inferiorly, but upon the sides of the alimentary canal, is the pair of long cæca (Pl. IV. fig. 18. C C) alluded to above. They are longer and narrower, less flattened than the superior pair, and widen out behind, upon either side of the rectum (*r*). Between them the gastric sac (G) forms a considerable dilatation downwards. Upon either side of the intestine is a row of four small flask-shaped sacs (Pl. IV. fig. 17. *a*, *b*, *c*, *d*), bent downwards, when "*in situ*," against the sides of the abdominal cavity, and which, commencing opposite to the anterior end of the large superior cæca, diminish in size from before backwards, and reach to their opposite extremity. Treviranus has described them as opening into the two long inferior cæca, which is certainly incorrect. They lie in the interval between them and the superior pair, but are attached to another pair of elongated lateral eflections (B B) of the intestine, perfectly distinct from either of the former, though partly concealed by them, and which have been figured by Ramdohr† under the title of the "grosse gefranzte Seitenzotten," in allusion to their series of appended sacs. By making a transverse section through the middle of the abdominal viscera, as has been done at fig. 19, the relative position of these (B B), and of the two other pairs of large cæca (A A, C C), to the stomach is very well seen, as also the extent to which they surround the cavity of the latter. It may be observed likewise, that, owing to the pressure of these cæca, the upper two-thirds of the gastric sac (S) presents an irregularly pentagonal form, while below (*) its surface is convex. Upon the outer side

† *Op. cit.*

of the three anterior pairs of small cæca are three other dilatations: the two anterior (Pl. IV. fig. 17. *h g*), one of which is slightly longer than the other, appear to unite and open by a common neck into the intestine; the posterior, nearly twice their length (*f f*), curves backwards, and terminates distinct from the other two. There are thus *thirty* cæca to the alimentary canal of *P. Opilio*; not thirty-one, as stated by Ramdohr, who represents an azygos pouch as arising between the two most anterior cæca, but which, with Treviranus, I have been unable to detect. Posteriorly, the alimentary canal terminates by a short and wide rectum (*r*), which opens externally between the last of the dorsal and ventral segments of the abdomen, the anus being situated upon a level with the latter.

With regard to the probable function which the above numerous cæcal appendages may perform in the process of digestion, it is difficult to offer any very satisfactory conjecture. Characteristic as they appear to be in general of the alimentary canal in those creatures which live exclusively upon the fluids of others, such as the *Planaria*, the leech, the *Aphrodite*, the *Nicothöe*, and in the Arachnida, the spiders and scorpions, with the Acaridean genera *Ixodes* and *Gamasus*, one would have expected to have found these organs less developed in the present group, from the very circumstance, already stated, of their mouth being adapted also to the purposes of mastication; and yet, strangely enough, their number and size is greater even than what is met with in the purely blood-sucking Araneidans. By some writers the parts in question have been regarded as so many reservoirs, in which the nutriment may be stored up, so as to serve the animal for some length of time, but this is an opinion which seems scarcely applicable to *Phalangium*, from the following facts. The dilated stomach usually contains a smooth, black and oval mass of excrementitious matter (Pl. IV. fig. 20. *f*, nat. size), and what is singular, this (*e*, magnified) is inclosed in a distinct membranous covering (*m*) which surrounds it continuously, and is thrown into slight transverse folds. The mass still adheres together after the latter has been removed, and, upon being broken up, is found to consist of the debris, or undigested hard parts of various insects, such as the eyes, legs, wings, antennæ, &c., imbedded in a granular substance. If, on the other hand, the contents of the cæca be examined, it will be seen to be a granular substance also, exhibiting under the microscope a similar appearance to the above, with this difference, however, that along with it no traces of organic remains can be detected. May it not be inferred from this, that one office at least of the cæca is to secrete this matter, which, discharged into the stomach, agglutinates the particles of food together? The investing membrane of the fæces may serve

to protect the delicate coats of the intestine from laceration, by the sharp and often spiny nature of their contents.

Of the two pairs of vessels described by Treviranus and mentioned above as biliary tubes (Gallgefässe), the superior (Pl. IV. fig. 17. *sv, sv*), after forming a loop upon the posterior rows of small cæca, winds round the intestine from the dorsal to its ventral aspect, where it crosses part of the ovarium in the female, and is in relation with the origins of the tracheal trunks, and returns into itself to form a single tube, which passes directly forwards, and is lost among the muscles of the manducatory apparatus. The second pair (Pl. IV. fig. 18. $sv' \; sv'$) are situated more to the sides of the alimentary canal, but I have been unable to trace their course. Treviranus states that it is shorter than the preceding one, and ends between the cæcal pouches. It is, however, probably also continued onwards to the cibarial organs, and the two pairs together may, perhaps, exercise some salivary function in relation to those complex parts.

The structure designated by Treviranus as the fatty mass (*f*) consists of a series of longitudinal and parallel intestiniform bodies, formed by membranous tubes, containing granular matter in their interior, and which lie upon the under surface of the stomach. They may fulfil the function of a liver.

Organs of Circulation.—These in *Phalangium* are as simple as the other structures are complicated. They consist of a heart divided into three chambers, lying in a groove upon the upper surface of the alimentary canal. The posterior division (Pl. IV. fig. 17. *p*) is situated, pyriform in shape, between the anterior extremities of the two large superior cæca, its broad end forwards, being received into a corresponding expanded portion of the groove. The middle chamber (H), about the same size as the two terminal, is contracted in the middle like an hour-glass, and placed between the two posterior rows of small cæca, being in relation, upon either side, with the longitudinal portion of the loop of upper salivary vessels. The anterior division (a''), of the same shape as the posterior, lies in a depression between the two anterior rows of cæca, and is prolonged downwards obliquely as a minute vessel, which, curving again upon itself, runs horizontally forwards. The structure of the heart is composed of a series of transverse, curved and muscular bands, leaving between them light and membranous intervals. It is plentifully supplied with nerves, which take a longitudinal course over it.

Generative Organs.—Were the anatomist familiar only with the anomalous conditions of the generative system in the Pulmonary Arachnida, with the singular transference of the means of fecundation to the extremities of the palpi in the male spider, and the termination of the internal organs, in both sexes, by a simple

transverse outlet upon the under surface of the abdomen, he would hardly be prepared to find, in dissecting one of the present group of animals for the first time, not only well-developed internal organs, but an external male and female apparatus for reproduction, comparable even, from its size and complexity, to that met with in insects. To such a degree may important differences in the structure of internal parts be masked by analogies of outward form.

The organs of generation in the *male* of *Phalangium Opilio* consist of a penis inclosed within a sheath, a vas deferens, and certain excretory glands, the analogues of the testes. All these parts are situated within the cavity of the abdomen towards its anterior extremity, lying along its under surface, immediately beneath the integument.

The *testes* are formed by a cluster of elongated, narrow and slightly tortuous cæcal tubes (Pl. IV. fig. 21. *st*), situated above the sheath of the penis when the latter is "*in situ*," and which, converging towards a central point, combine to form a single spermatic duct (*r*), which is continued onwards to the extremity of the male organ. The above cluster of seminal tubes is in relation above with the medio-abdominal nerve, which crosses over it, and the under surface of the gastric sac; on either side of it are seen the long inferior cæca of the latter, and emerging from among the lateral tubes, the nervous ganglia (ng') which supply these organs.

The duct or *vas deferens* (*v*), given off as already stated, passes in a tortuous direction above the testes, which it resembles in texture very much in the posterior half of its course, and extends to about twice their length within the abdominal cavity. Its anterior half is tough and horny (v''), and surrounded, nearly as far as its entrance into the penis, by an oblong ovoid body of considerable density and thickness (*v*).

The *penis* (Pl. IV. fig. 22. *p*), though simple in its structure, is remarkable from its length, nearly equalling the half of that of the abdomen. It is composed of two distinct portions, a body (*p*) and glans (*g*), both of a very firm coriaceous texture.

The body, which constitutes by far the largest portion of the organ, is slightly curved throughout its entire length, the concavity being directed upwards, and broad behind at its commencement, gradually narrows towards its anterior extremity. It is compressed from above downwards and grooved upon the upper surface. At its base it presents superiorly a large crescentic opening (*o*) for the passage of the continuation of the spermatic duct, or the ductus ejaculatorius, which traverses it throughout as a rigid horny tube (*t*), and opens into the base of the glans. The termination of the body of the penis in front is somewhat

dilated, and exhibits two small, oval and concave plates (*ps*), situated upon its upper surface, and diverging obliquely from the dorsal groove upon either side. They are darker in colour than the rest of the body, and separated internally from each other by a narrow space. Their outer margin, dark brown, is prolonged in the middle in a triangular shape, and curved towards the median line. The second piece of the male organ or glans (*g*) is articulated to the former in a ginglymoid manner, and rests obliquely downwards upon the two above-mentioned plates. It is widest behind where it projects in a rounded base, which has two slender elevator muscles attached to it, is concave upon its upper and lower surface, and furnished at the apex with a small, acute, slightly bent and moveable hook, at the base of which, inferiorly, is a minute triangular aperture for the exit of the seminal secretion.

The whole of this penis is contained in a *sheath* (Pl. IV. fig. 23. *sh*) of similar contexture, which is situated partly in the hollow of the sternum (*s*), and partly against the ventral parietes, being about twice the length of the former. It is broader than the organ it incloses, and being more or less transparent, admits of the outline of the penis (*p*) being very distinctly seen through its parietes. Though described by Treviranus as a simple sheath, this organ consists of two elongated pieces with well-defined margins, connected to each other by a membrane, which is very easily torn through in dissection if care be not used, and gives the idea at first, of the structure in question being formed by a couple of separate valves. The lower of these pieces is carinate in form, to adapt itself to the corresponding surface of the penis against which it rests, and is continuous behind with the inferior part of the margin of the opening in the base of that organ; its lateral borders become thicker towards their anterior extremity, and terminate by curving outwards as two horny projections or hooks (*h*), which are connected upon either side to the edges of the sternal plate, with an inflection of which the inferior part of the sheath is confluent anteriorly (*a*). The second portion of the sheath, attached to the remaining edge of the urethral opening, extends almost flat over the upper grooved surface of the penis, and ends in front by a rounded free border (*). From the opening between the two conjoined pieces the glans of the male organ protrudes.

The relative position of the above parts "*in situ*" is precisely as follows:—Inferiorly, lying within its sheath in the concavity of the sternum, is the intromittent organ. Above, covering the anterior half of the sheath, the divergent angles of the latter, and the glans penis being partially visible, is the cluster of seminal vessels. Immediately behind the latter is the horny portion of

the vas deferens in its surrounding body, lying lengthways upon the upper surface of the posterior half of the sheath, but not extending quite to its base, so as to leave the opening into the penis perfectly visible. The two structures called by Treviranus the ligaments of the sheath, are, without doubt, a pair of retractor muscles (Pl. IV. fig. 21. *rm*). They arise, broadest, upon either side of the opening in the base of the penis, and passing backwards along the under surface of the abdomen, where they come into relation with the two branches and their ganglia of the medio-abdominal nerve (*ng*), diverge to be inserted into the lateral angles of the penultimate dorsal arc. Part of the fibres of these muscles are continued onwards from their origin to form a muscular sheath, apparently composed of large and detached ultimate fibrils arranged side by side in a single layer, over the sheath of the penis, the vas deferens and seminal tubes.

Behind the testes, extending across the under surface of the stomach, is a broad intestiniform tube (*), curved in the shape of a Z, and constricted in five or more distinct places, which is supposed by Treviranus to belong to the generative system of the male, as it is met with only in that sex, and to perform some function connected with the elaboration (Absonderung) of semen. It is membranous, and contains a granular-looking substance, and terminates by its extremities in two long filiform tubes, which are said also by Treviranus to lose themselves among the blind appendages of the alimentary canal. I have examined the direction of these minute ducts with great care, and find that they pass forwards and curve round the tracheal trunks near to their origin from above downwards, and are lost at the inner extremity of the spiracular groove, where they may probably open externally. The function assigned to this part is thus rendered extremely problematical.

It is doubtless preparatory to the intercourse of the sexes, that, during the autumn, many male specimens of *Phalangium* may be taken, having the penis and its sheath completely extruded from the cavity in which they before lay concealed (Pl. IV. fig. 25.). In this operation the sheath is turned inside out, and the curved and flexible hooks upon either anterior angle turn also over, from above, downwards and backwards, towards the latter end of the process. But not only do the external organs of generation thus undergo a remarkable change of position, but the internal are, to a certain extent, displaced. The horny portion of the vas deferens and its surrounding body, appended close to the root of the penis (Pl. IV. fig. 23. *v′v*), and the muscles upon either side of the latter, are thrust out of the abdomen along with that organ, and as it quits its investing sheath enter the latter, but are in contact then with its external surface, changed by eversion, to within. The

first of these organs (Pl. IV. fig. 24. *v''*) may be readily seen through the extruded sheath, where its presence is indicated by a dark line, shadowed externally, and may be even drawn into it, when the parts are all in their natural position, by laying hold of the extremity of the penis with a fine pair of forceps. The extrusion is, I believe, effected by the contraction of the fibres of the corium, which, by diminishing the abdominal cavity, press upon the generative organs from behind and cause them to spring out, while the retraction of the penis, and with it, of course, the sheath, is performed by the two special muscles above described. I may observe, that, owing to the protrusion of the anterior part of the vas deferens, the whole of it is placed in a more direct position in relation to the seminal cæca, and the passage into it, of the secretion from the latter, thus greatly facilitated.

EXPLANATION OF PLATE IV.

Fig. 15. Inferior view of the epipharynx, to show the pharynx lodged in its interior, and the commencement of the œsophagus; A A are the first pair of maxillæ with their horny bows; 2 2, second joints of the palpi; *s*, the vertical septum.

Fig. 16. Anterior opening into the pharynx; *dp* is the deflexed termination of the dorsal plate of the latter, forming at its apex a corneous lip; *m m* are muscular fasciculi.

Fig. 17. The alimentary apparatus, seen from its upper surface, the pharynx and œsophagus having been removed.

Fig. 18. The same, from below. The corresponding cæca are lettered the same in both these figures.

Fig. 19. An oblique transverse section of the abdominal viscera through their middle in a female *Phalangium Opilio*. The epidermis has been removed, leaving only the membranous layer *m'm'* beneath it, with the fibres of the corium, *m m*, resting thereupon; the relations of the ovarium, O, and ovipositor, *or*, are also seen.

Fig. 20. Oval mass of fæces, inclosed in its membranous* capsule.

Fig. 21. The male generative organs dissected out, and seen from their under surface; *c c* are the pair of latero-inferior long cæca; *a*, the anus.

Fig. 22. The penis, the sheath having been removed, viewed from above.

Fig. 23. The same, lying within its sheath, *sh*, in the concavity of the sternum, *s*.

Fig. 24. The sheath and penis extruded from the sexual opening, seen from their inferior surface; 1, 2, 3, 4, coxæ of legs; B is the second pair of jaws; D, appendages to second coxal joints.

Fig. 25. A male *P. Opilio*, viewed from the side, with the sexual organs extruded. The legs have been cut off, through the extremities of the third joints.

The preceding figures are magnified as in Plate III.

[To be continued.]

* I have been unable to discover with the microscope any traces of a distinct structure in the membrane forming this sac, the texture of which is smooth, homogeneous, and so thin as to be transparent. Its existence has been very constant in the many specimens of *Phalangium* which I have examined.

XXXI.—*The Birds of Ireland.* By Wm. Thompson, Esq., Pres. Nat. Hist. Society, Belfast.

[Continued from p. 38.]

The Partridge—*Perdix cinerea*, Briss.—is common in suitable localities throughout Ireland*, but may be set down in general terms as less plentiful than in England, and the more southern portion of Scotland. This, however, is not owing to any natural causes, but to the superior cultivation of the land, and greater care bestowed upon the preservation of the species in Great Britain.

Where partridges are rigidly protected in Ireland, as on the estate of the late Earl O'Neil, I have on two or three occasions, when riding in the autumnal evenings after sunset between Randalstown and Toome, in the county of Antrim, heard their shrill, but most pleasing calls constantly uttered, and have seen a covey in almost every little field. On looking to the food contained in a few partridges, shot in different localities in the early spring, it was found to be chiefly grass, and occasionally other green vegetable matter; in one instance the tender leaves of a thistle, and a few seeds. A sportsman informs me that he has often found "clocks" (coleopterous insects) in those killed in the mountains:—the partridge not uncommonly frequents mountain-heaths contiguous to cultivated ground.

There is a singular difference in habit between the partridge of the north of Ireland and that of the opposite portion of Scotland, as is well known to sportsmen who have shot in the different countries, and which I have myself remarked with some interest. An Irish covey generally springs without uttering a call, but the Scotch covey shrieks with all its might when sprung. The Scotch birds too, even where very little molested, more knowingly take care of themselves than the Irish: their watchfulness is extraordinary. Their sense of hearing, as well as of sight, must be remarkably acute. I recollect that on one day in the month of October, an experienced sportsman and myself sprung either twenty-four or twenty-six covies (nearly all double, or containing about two dozen of birds,) in the neighbourhood of Ballantrae, when they one and all not only forbade a near approach, but, though we advanced as silently as possible, never let us into the same field with them.

The Quail—*Perdix Coturnix*, Lath.—is a common species in summer throughout the cultivated districts; and great numbers winter in the island. Montagu, writing in 1802,

* Lieut. Reynolds, R.N., of the Coast Guard Service, an ardent sportsman, who was stationed at Achil in 1834, when Mr. R. Ball and I visited the island, stated that neither partridges nor quails were at that time found there. As the island is chiefly covered with heath, grouse might be supposed to be common; but they were said to be scarce, on account of the number both of "four-footed and winged vermin."

says, with respect to England, and probably alluding chiefly to the south, where he resided, that these birds are "in much less quantity than formerly." Mr. Selby in 1825 remarks, that "they now visit us in much fewer numbers than they formerly did, and their appearance in the midland and northern counties of England has of late years been a rare occurrence." In 1837, Mr. Macgillivray observes—"it is seldom that they are now met with in Scotland." It may appear singular, yet true it is, that all this while they have been increasing throughout Ireland*; and that of late years there has been a decided augmentation in the quantity remaining during winter.

In the wheat districts around Belfast, quails were always common, but in a locality well known to me, stretching towards the mountain base, where oats were always grown in quantity, they did not appear until the introduction of wheat; but, though this grain has almost ceased to be cultivated there, the birds continue in the district. J. V. Stewart, Esq., in a letter dated Rockhill, Letterkenny, Feb. 3, 1837, remarks, that "quails are only found in the most improved lowland parts of the county of Donegal; and where some years since they were very rare, are now becoming annually much more common. This is to be accounted for by the increased growth of wheat." In the year 1837, I learned from the late T. F. Neligan, Esq. of Tralee, that "within the preceding eight or ten years the quail had become much more common in the county of Kerry, within which period cultivation had much extended."

Thus, in keeping pace with the cultivation of grain in the northwest and south-west extremities of this island, it may appear extraordinary that the numbers of these birds visiting Great Britain should have so diminished in the present century, when cultivation has been so vastly improved. But the higher state of cultivation is one thing, and the introduction of grain-crops into districts in which they were before unknown is another; and though it may appear strange, yet I am disposed to believe that the slovenly system of farming in Ireland, unfortunately too general, is one source of the quails' attraction to the country, as, at all seasons, the weeds among the stubble supply these birds with abundance of food.

With respect to the quails' continuance during winter in numbers throughout Ireland, to the extreme north, I gave some details in the 4th volume of the 'Annals' (p. 284), the purport of which was, that for many years past they have been daily, during winter,

* The following extract from 'A Brife Description of Ireland made in this yeere 1589, by Robert Payne,' shows that quails were common at that period. "There be great store of wild swannes, cranes, phesantes, partriges, heathcocks, plouers, greene and gray, curlewes, woodcockes, rayles, quailes, and all other fowles much more plentifull than in England. You may buy a dosen of quailes for iii.d., a dosen of woodcockes for iiii.d., and all other fowles ratablie."—Reprinted in Tracts relating to Ireland, printed for the Irish Archæological Society: Dublin, 1841.

exposed for sale in the shops*, and, that in various parts of the counties of Down and Antrim, a friend when snipe-shooting at that season always meets with them in patches of cultivated ground lying between one bog and another. In some winters he has remarked quails to be as common as they are in autumn, at the commencement of the partridge-shooting season. So many as ten brace were shot by a young sportsman during a forenoon in the winter of 1837–38, in stubble-fields adjacent to Belfast bay†. More have wintered here in the comparatively mild seasons of the last dozen years than formerly. But that quails have for a long time past remained permanently in some quantity in the counties last named, I have the testimony of a veteran sportsman, who, from meeting with them every winter for the last sixty-five years, had always looked upon them as indigenous, and not as migratory birds. In the letter from Mr. J. V. Stewart before referred to, that gentleman mentions his having met with the quail at the end of January about Letterkenny; and Mr. George Bowen, of Burt, in the north of the same county (Donegal), informs me that five or six brace can easily be obtained there in the course of a day's shooting about Christmas‡.

Over the continent of Europe, including the most southern portions, the quail is looked upon only as a summer visitant, excepting in Portugal, where it is found throughout the year, and "more numerously in winter than in summer§." This is a highly interesting fact, considered in connection with the wintering of the species in Ireland. Thus, from its remaining permanently in the most western part of the southern portion of Continental Europe, and the most western island in a considerably higher latitude, it would seem that the influence of the Atlantic Ocean is the predisposing cause, by counteracting the severity of winter in a twofold manner, both as to the feeling of cold and the facility of procuring food. Colonel Sykes, in a most valuable memoir on the Quails and *Hemipodii* of India‖, in which an ample acquaintance with these birds is manifested, coincides with Temminck in the opinion, that "quails emigrate for food, rather than to enjoy an equable climate;" in proof of which it is mentioned, that "the great changes of temperature in India do not influence the movements of this species, food being abundant at all seasons:"—the common quail of Europe is resident there. There

* Feb. 1, 1842. The chief dealer in quails in Belfast assured me that the number of these birds purchased by him in the last three months, or throughout the winter, would average about three dozen a week; on one day five dozen were brought to him. Being fat and in high condition, they were readily sold at from 8*d.* to 1*s.* a brace.

† Some details of numbers killed will be found in the communication last alluded to.

‡ Montagu states that—"In October they leave us, and return south, leaving some few (probably of a later brood) behind to brave the severity of our winter." To this Mr. Selby is disposed to assent. In Ireland a fair proportion of adult birds of both sexes is shot throughout the winter.

§ Selby, vol. i. p. 438.

‖ Transactions of the Zoological Society of London, vol. ii.; and largely quoted in Yarrell's 'Brit. Birds.'

is so little frost in Ireland that food is generally to be procured with ease, and is so far corroborative of the view just mentioned. But I have had evidence of the evil influence of cold upon the quail, by finding it among rushes close to the sea-side (Belfast bay) in severe frost, when our indigenous birds were likewise suffering from the weather, and have known one on such an occasion to be shot on the oozy banks of the bay at low-water, a furlong from the shore*.

The call of the quail, here interpreted *wet-my-foot*†, is frequently uttered from "earliest dawn to latest eve" in spring and the more genial periods of the year‡, and during winter also may occasionally be heard in the north of Ireland. Mr. R. Davis, jun. of Clonmel, remarks, that there is "great variety in the colour of quails' eggs; I have some nearly covered with dark spots, and others almost plain." So late as the 24th of September 1834, a friend sprung one of these birds from its nest, and on the 9th or 10th of October in the same year, he met with two broods of young birds, some of which could not fly. Although fields of grain are the quail's chief resort, I have known clover-fields in grain districts to be its favourite haunt in spring and summer; and in these seasons it occasionally frequents meadows. Among turnips it is not unfrequently met with in winter. Of eighteen quails shot at various times and places during winter and early spring, the greater number, on being opened, were found to contain only very small seeds of various kinds; among others, those of the noxious weed, the dock (*Rumex*); a few, the seeds of different species of vetches; still fewer, green vegetable matter, or grains of wheat; and one, large peas:—they all exhibited sand, or fragments of stone.

In the month of August 1826, I met with quails in Italy. At Malta, on the 19th of April 1841, I saw at table some which had been brought from Naples, whence, likewise, a quantity hawked about the streets was procured. It is said that a few of these birds remain permanently in the island of Malta. On the passage of H.M.S. Beacon thence to the Morea, occupying from the 21st to the 27th of April, a quail alighted on the vessel; it was the only

* Pennant states his having been assured "that these birds migrate out of the neighbouring inland counties, into the hundreds of Essex, in October, and continue there all the winter: if frost or snow drive them out of the stubble fields and marshes, they retreat to the sea-side, shelter themselves among the weeds, and live upon what they can pick up from the *algæ*, &c. between high- and low-water mark. Our friend remarks, that the time of their appearance in Essex coincides with that of their leaving the inland counties; the same observation has been made in Hampshire."—*British Zoology*. I have not met with any allusion to this in subsequent works on British Ornithology. It would be desirable to know if such be the case at the present time.

† In some of the continental countries, and particularly in Holland, I have been surprised to see poor quails imprisoned in miserably small cages, and hung outside the windows like singing birds, apparently for their music, which consists but of the above three notes.

‡ I have notes of hearing the call in September, half an hour after sunset; indeed, of their calling and answering each other until dusk.

one seen. The great body of them had previously crossed the Mediterranean. On the 29th of that month I sprung a brace near Navarino. Mr. Wilkinson, jun. of Syra, son of the well-known and highly esteemed British consul in that island, informed me that quails are not seen on their autumnal migration at Syra when the wind is southerly, but when it is north-east they alight in great numbers from the 10th to the 30th of September. Their coming is always announced by the call of the heron, which accompanies them throughout the period of their migration. This is described to be "reddish-brown on the back and cream-coloured elsewhere," and is probably the *Ardea comata*, or Squacco heron. They never remain longer than one day. Mr. Wilkinson has been told by friends resident at Alexandria, that the earliest arrival of the quail there is about the 20th of September.

LITTLE BUSTARD, *Otis Tetrax*, Linn.—In the 'Proceedings of the Zoological Society of London for 1835' (p. 79), I noticed, on the authority of Mr. W. S. Wall, an intelligent bird-preserver, and well acquainted with Bewick's faithful portraits of British birds, that a little bustard, sent to him by Mr. Reside to be stuffed, had been shot by that gentleman in the county of Wicklow on the 23rd of August 1833, and that another was seen at the same time. I subsequently learned from Mr. Haffield of Dublin, who was present on the occasion, that they were seen, associated with golden plover, in the bog of Killough, adjoining Powerscourt demesne, and about five miles from the sea. They proved to be less wary than the plover. The survivor remained for some time about the locality after its companion was killed. The singularity of its cry was particularly noticed by my informant*.

XXXII.—*Descriptions of three new species of the Coleopterous genus* Gyriosomus, *collected in Chile by T. Bridges, Esq.* By G. R. WATERHOUSE, Esq., Assistant Secretary and Curator to the Zoological Society, &c.

Section HETEROMERA.

Family NYCTELIDÆ.

Genus GYRIOSOMUS, *Guerin*.

Gyriosomus Bridgesii. Gyr. ater; elytris sutura elevata, supra lineis irregularibus (plerumque longitudinalibus), anticeque maculis parvulis, albis, ornatis. Long. $8\frac{1}{2}$—10 lin.; lat. 5—$6\frac{1}{2}$ lin.

Corpus ovatum, convexum.

Found in the vicinity of the city of Coquimbo, Chile.

This species greatly resembles the *Gyriosomus Hopei*, but is smaller, the thorax is shorter and broader, and the legs are more

* THE GREAT BUSTARD, *Otis Tarda*, Linn., was enumerated by Smith (1749) as one of the birds of the county Cork. It is long since extinct.

slender; it differs moreover, constantly, in having the suture of the elytra raised into a keel. The white markings on the elytra resemble those of *G. Hopei*, and are slightly impressed in the same way.

Gyriosomus marmoratus. Gyr. ovatus, nitidus; elytris maculis valde irregularibus albis impressis. Long. $9\frac{1}{4}$—10 lin.; lat. $5\frac{1}{2}$—$5\frac{3}{4}$ lin.

Found on the mountains near Villa Vicuña, province of Coquimbo.

This species is intermediate in form (and in its characters generally) to the *Gyriosomus Hopei* and the *G. lævigatus*. The body is convex, ovate, and very glossy. The head has a few distinct scattered punctures in front, and a transverse depression in a line with the points of insertion of the antennæ. The thorax is transverse, very convex, broader behind than in front, and has the sides slightly rounded. The elytra are smooth and glossy, but with irregular depressions in parts; and these depressions are filled with scales or powder-like substance producing most irregular markings and varying much in individuals; there are generally, however, three or four largeish irregular white patches towards the sides (or rather the lateral keel) of the elytra; a few small spots on the disc: sometimes there are a series of small spots arranged in a line near the suture, and often the lateral larger patches have a tendency to run into each other by throwing out an oblong mark near to and parallel with the lateral keel; this is prominent and distinct, and almost reaches the apex of the elytra; it is rough, and divided by a longitudinal groove.

Gyriosomus elongatus. Gyr. elongatus, subovatus (lateribus corporis in maribus fere parallelibus), ater, squamulis piliformibus fusco-albis plerumque vestitus. Capite indistincte punctulato; thorace transverso, lateribus ante medium dilatato, disco convexo, rugoso; elytris squamulis albo-fuscescentibus dense tectis, at lineis pluribus subelevatis, obliquis, vel longitudinalibus, denudatis notatis. Long. 11 lin.

This species is found in the plains between Huasco and Coquimbo.

The legs and antennæ in this species are rather longer and stouter than usual in the genus; these are for the most part covered, as well as the body, with very minute, adpressed, brownish-white hairs. The insect appears, in fact, as if it had been powdered with dust, but on the elytra the powder-like substance is much more dense than in other parts; it is however broken up by denuded portions which are slightly raised and form lines which vary in individuals, but the common type of the black markings is as follows: on the basal third of each elytron is a central longitudinal broadish black mark, throwing out in an oblique direction one or two narrower lines; on the remaining two-thirds of

the elytra are three black lines, which are about half the width of the whitish interspaces; one of these lines is parallel with and at a short distance from the suture; the other two are directed obliquely outwards, being furthest from the suture at the apical end of the elytron. The thorax in the male is as broad as the elytra (the sides of which are parallel in this sex, but slightly dilated in the female), and it is broadest rather in front of the middle.

XXXIII.—*Description of a new Fossil Cirripede from the Upper Chalk near Rochester.* By Mr. G. B. Sowerby, Jun.

To the Editors of the Annals of Natural History.

Gentlemen,

I have much pleasure in presenting the accompanying letter and drawings for publication in your valuable periodical. As the fossil, independent of its great beauty, appears to be quite new to science, I am desirous of its being published as soon as possible.

I remain, Gentlemen, very truly yours,

N. T. Wetherell, F.G.S., M.R.C.S. &c.

Highgate, Sept. 12, 1843.

Dear Sir,

Having carefully examined the beautiful fossil which you sent me from the Upper Chalk near Rochester, I conclude it to be a Cirripede of the Pedunculated kind, but so different from everything with which we are yet acquainted as to form the type of a new genus. The description however must be imperfect, only one side of the shell being visible, and some important parts being possibly wanting.

Fig. 1.

Fig. 2.

I send two drawings, fig. 1. showing the fossil as it is seen imbedded in the chalk, outside the cast of a large Ammonite; and fig. 2, which is partly conjectural, a front view, showing where the cilia (*a*) might protrude, and the probable form, if any, of the basal attachment (*b*).

I propose to describe the shell as follows:—

Class CIRRIPEDES.

Fam. Pedunculata.

Loricula pulchella.

L. testa oblique ovali, ventricosa, lateraliter subcompressa; apice conica, valvis (utrinque ?) tribus, triangularibus, lævibus, antica

majori, margine antico subrotundato, subarcuato; parte principali (pedunculo ?) ad basin gradatim attenúata, squamarum seriebus (utrinque ?) quatuor; squamis transversis, marginibus arcuatis, terminalibus acutis alternatim interpositis (sicut piscium squamis); serie antica, squamis brevibus, ad marginem externum rectis, seriebus medianis duabus squamis elongatis, utrinque acuminatis, serie postica squamis brevioribus ad marginem externum rectis.

You will perceive that in the above no more is described than is visible; but by the hypothetical introduction of the word "utrinque," my belief is expressed that each row of scales and each apicial valve is repeated on the opposite side, so that the apex would consist of three pairs of valves, and the body or peduncle of eight series of scales. These scales increase in width towards the centre and thence gradually diminish, until at the base they are so narrow as to leave a doubt whether there be any tendinous process of attachment, as in other pedunculated Cirripedes; or whether the animal may have lived, like *Acasta,* unattached, although confined in the hollow of some of the numerous sponges found in the same formation.

The two central rows of scales on the side under observation are united with each other and with the other two by the alternate intersertion of the pointed ends, while the external edges of the other two rows are straight, so that the shell might be split into two halves without cutting through a single scale.

With regard to these series of large scales, it is difficult to determine whether they be analogous to the minute scales covering the peduncle of the Pollicipes, or to the small lower valves immediately surrounding the upper ones. I am rather inclined however to the former supposition, in which case our shell would form a connecting link between the two classes of Cirripedes.

In the Pedunculated family the upper valves correspond with the operculum of the Sessiles; the smaller ones which immediately surround them may be compared to the parietal portion, and the peduncle agrees with the base. But in *Loricula,* these rows of valves or scales, forming so large a portion of the whole body, render them much more comparable with the parietal parts, and therefore bring the shell much nearer to the Sessile family.

Hoping the publication of these imperfect details may elicit further inquiry,

I am, dear Sir, yours truly,
G. B. Sowerby, Jun.

N. T. Wetherell, Esq.

XXXIV.—*Description of some apparently new Insects from the Congo, sent to England by Mr. Curror, Surgeon R.N., and the late Mr. John Cranch.* By Mr. ADAM WHITE, M.E.SS. Lond. and Paris, Assistant Zool. Dep. British Museum.

I INTEND giving here a list of such insects as I have seen on the banks of the Congo lately collected by Mr. Curror, surgeon of the "Water Witch," and among these, added to the specimens collected in Tuckey's expedition, now in the British Museum, I trust that a sufficient number of forms will be found to make the list interesting to the student of the geographical distribution of insects.

The unfortunate termination of the expedition to explore "the river Zaire, usually called the Congo," in 1816, under the direction of Capt. Tuckey, is well known; in the list of supernumerary passengers, exclusive of the crew of forty-nine, who went out, occur as the first names those of "Mr. Professor Smith, botanist, and Mr. Cranch, collector of objects of natural history." To the zoologist the name of the latter is a well-known sound; Montagu and Leach have published the results of some of the labours of the Devonshire naturalist. To some of the marine productions of our southern shore, first discovered by him, his name has been applied; in the preface to a paper on Annulosa, I need only mention the two Crustacea, *Ebalia Cranchii* and the rare *Achæus Cranchii*, taken by him in Falmouth bay. Should his eulogy be wanted, consult the works of Leach and Col. Montagu. Mr. Cranch died in his 31st year, a victim to the climate of unhealthy W. Africa: he was buried at Embomma along with Mr. Tudor, his comrade. A friend thus writes of him (Introd. to Tuckey's Narrative): "If I may judge from external appearances, he was an affectionate husband and father, a sincere friend, a pious, honest and good man."

His collections are in the British Museum. Thirty-six only of his insects, according to Dr. Leach, "reached England in a tolerable state, the rest were entirely destroyed by insects and damp." Five or six of these were regarded by Leach as species new to entomologists; two have been described: one, the *Platygenia Zairica*, by MacLeay; another by Serville from Dejean's collection, the locality of which was unknown; it is the beautiful longicorn beetle, *Euporus strangulatus*.

Papilio Ridleyanus, n. sp. Pap. ecaudatus fuscus, alis anticis subelongatis, supra maculis 5 flavo-miniaceis, posticis supra miniaceis, fusco marginatis nigroque maculatis, posticis subtus caryophyllaceo flavoque tinctis. Exp. al. ♂ unc. 3 fere, ♀ unc. $3\frac{1}{2}$.

Hab. ad oras fluminis Zaire. Dom. Curror lexit. Brit. Mus.

Wings above of a brownish black with red spots and marks, the upper wings here and there semitransparent.

The first pair have two bands of a darker brown in the discoidal cell; in one specimen, a female, these bands are margined with pale ochrey; there are five red irregular spots between the discoidal cell and the posterior margin, the one nearest the tip smallest; in one specimen, a male, almost obsolete; in the female this terminal spot is larger: the last of the spots linear and close to the posterior margin; the penultimate notched towards the discoidal cell, and abruptly straight behind; in the female the margins of these spots are yellowish.

The second pair of wings have their general upper surface red; black at the base, emitting lines along the nervures, with two or three irregular black spots in the middle and along the hinder margin of the red; the posterior margin is brownish black, narrowest inside, with two or three red spots and indications of red streaks. In two specimens, one of them a female, some of these cells are yellowish; in one male they are only margined with yellowish.

The under side of the first pair of wings resembles in colour the upper side, but is paler; the under side of the second pair is mixed with red, greenish and pinkish tints, varying according to the position they are examined in—the last-mentioned colour prevails; on the surface there are at least twelve deep black spots of different sizes; the posterior margin is of a faint brown with six or seven pale, transversely elongated spots on its edge, and some indistinct red spots before them. The *head* is black, spotted with white above; cheeks and face yellowish with a black line down the middle: the *thorax* is brownish black spotted with whitish, especially on the sides beneath the wings: *abdomen* brown, sides spotted with yellowish, beneath yellowish barred with brown, the bars in the middle of the belly dilated into spots; femora dark; tibiæ and tarsi palish. Extent of wings of the smallest male specimen (which is more elongated and has the first pair of wings slightly sinuated behind) nearly three inches; of the largest, a female, rather more than three inches and a half.

This very distinct species of African butterfly is of the same form as the *Papiliones Latreillianus, Tynderaus* and *Leonidas,* three well-known W. African insects in Boisduval's 15th group (Lep. i. p. 239). To the scarce *Papilio Antimachus* figured by Drury, it has, at first sight, a curious relationship, as was pointed out to me by Mr. E. Doubleday. To him I am indebted for the opportunity of paying a debt I have long owed* to the memory of Mr. Ridley, a gentleman in the W. African Coast Service, whose love for our favourite science was displayed by a collection he made near the fort of Accra and sent to this country. He gave great promise of excelling in entomology, and fell a victim to the climate of W. Africa. In a small collection shown me by his friend Mr. Humphreys, I had assigned his name to a black and white *Papilio* since described by Mr. Westwood. I hope that as this species does not occur, as far as I am aware, in

* See Entomologist for July 1841, p. 136.

any book I have consulted, the compliment may prove a *permanent* one. The striking resemblance in colour and form to some species of the *Acræa* genus, such as *Zethea,* must be evident to every lepidopterist.

I may add, that the accompanying figure of the male was most kindly drawn for me by Mr. Humphreys.

One of the few insects saved from Tuckey's expedition is a large species of *Bombyx* : it is fulvous yellow, sprinkled over with minute brownish spots ; the wings are very hairy, and have a few waved transverse streaks of a brownish colour on the upper side ; the lower wings have, at the base above, a dark brown patch of fur-like hairs ; its antennæ somewhat resemble in form those of the female of *Chelepteryx Collesi* of G. R. Gray (the *Saturnia Laplacei,* Feisthamel, 'Voy. Favorite'), and I have little doubt it is a female ; with our present information on the subject of exotic genera of moths, I dare not venture to suggest a new generic name for this insect, especially as there is but a single specimen in the Museum, and therefore refer it to the magazine genus *Bombyx,* with the following specific character :—

Bombyx Mariana. B. villosa fulva, fuscis pilis stictica, alis anticis supra strigis transversis 3—4 fuscis obscuris, posticis supra basi villosissimis, macula magna rufescenti fusca, strigisque 3 transversis distinctis, 2 posterioribus (post mediam alæ partem) approximatis ; corpore subaurantiaco, alis infra pallidioribus fascia tenui communi transversa fusca. Exp. al. unc. $5\frac{1}{2}$ fere.

Hab. ad oras fluminis Zaire. Legit Dom. Cranch. Brit. Mus.

Cicindela neglecta, Dej., Spec. gen. des Col. i. p. 114. no. 96.

One specimen of a slight variety of this Senegal species was brought from the banks of the Congo by Mr. Curror, Surgeon R.N.

Graphipterus cicindeloides, Dej., Spec. gen. des Col. v. p. 458. sp. 7. "Carabus cicindeloides, *Oliv.*"

One specimen of a variety from the banks of the Congo.

Anthia gracilis, Dej., Spec. gen. des Col. v. 468. 17; Dupont in Guerin's Mag. de Zool. 1832.

Two specimens of a local variety of this occur, from the banks of the Congo.

Eunectes griseus, Aubé, Spec. gen. des Col. vi. p. 124.
Dytiscus griseus, *Fabr.* var.
Dytiscus sticticus, *Fabr.*

A specimen of this cosmopolite species was brought from the banks of the Congo by Mr. Curror.

Amongst the Lamellicorn beetles Mr. Curror has sent specimens of

Eudicella Grallii (Buquet), White, Mag. Nat. Hist. iii. p. 28, 1839.
Goliathus Grallii, *Buquet*, Annales de la Soc. Ent. de France, v. p. 201.
Dicranorrhina Grallii, *Burm.*, Handb. iii. p. 191. pl. 5. f. 3.

Hab. ad oras fluminis Zaire vulgo Congo dicti. Dom. Curror lexit. Brit. Mus.

Both males and females of this species occur, varying in the colouring of the elytra and in the size of the fork in the male. As the female resembles the male excepting in the head and the structure of the legs (especially the fore ones), &c., as in other species of the genus, I need hardly describe it; but as it is yet unfigured, I will take care that a figure of the female and of a very handsome male be published in some entomological periodical. M. Lucien Buquet in 1835 was uncertain of the precise locality of this very handsome insect: his figure of the male represents it by far too slender. Mr. Charles Curtis's figure in the 'Mag. of Nat. History,' representing a species of this genus, is more characteristic, as are Mr. Westwood's figures of the Goliath beetles of this subgenus in the 'Arcana Entomologica.'

Cœlorrhina guttata, Burm., Handb. iii. p. 208.
Cetonia guttata, *Oliv.*, Ins. i. p. 15. no. 10. pl. 2. f. 7 *a*. ♀.
Gnathocera guttata, *Gory et Perch.*, Mon. des Cet. p. 144. pl. 22. f. 6 ♀; *Buquet*, l. c. p. 205. pl. 5. f. 6 ♂.

Mr. Curror has brought both sexes of this from the Congo. We are indebted to the Rev. D. F. Morgan for specimens from Sierra Leone, which, with his entire collection of insects, he most liberally presented to the national collection.

Plæsiorrhina cincta, Burm., Handb. iii. p. 213.
Scarabæus cinctutus, *Voet.*, Col. i. p. 11. t. 2. f. 9.
Cetonia tænia, *Pal. de Beauv.*, Ins. Rec. p. 28. pl. 5. f. 3.
Gnathocera tænia, *Gory et Perch.*, Cet. p. 138. pl. 21. f. 4.

One specimen, brought by Mr. Curror from the banks of the Congo.

Coryphocera Africana, Burm., Handb. iii. p. 230.
Scarabæus Africanus, *Drury*, Ins. ii. p. 54. pl. 30. f. 4.
Gnathocera Africana, *Gory et Perch.*, Cet. p. 132. pl. 19. f. 6.

A very abundant species on the banks of the Congo.

Coryphocera monoceros, Burm., Handb. iii. p. 232.
Gnathocera monoceros, *Latr.*, Gory et Perch., Cet. pl. 21. f. 3. p. 137.

One specimen from the banks of the Congo, brought by Mr. Curror.

Gnathocera trivittata, Burm., Handb. iii. p. 546.
Scarabæus (Cetonia) trivittatus, *Swed.*, Acta Holm. 1787, p. 190. sp. 7.
Amphistoros trivittata, *Gory et Perch.*, Cet. p. 145. pl. 23. f. 1.

Not uncommon on the banks of the Congo.

Platygenia Zairica, MacLeay, Hor. Ent. pt. 1. p. 151.
Platygenia barbata, *Burm.*, Handb. iii. p. 730.
Trichius barbatus, *Afzelius*, in Schönh. Syn. Ins. i. 3rd pt. p. 38.

Not uncommon on the banks of the Zaire.

This may be the *Trichius barbatus* of Afzelius. As the specimens agree closely with the male collected by Mr. Cranch and described by MacLeay from the example in the British Museum, I give his name: this is the insect alluded to by Dr. Leach in the Appendix to Tuckey's Narrative (p. 418) as "a new genus of the family *Scarabæidea*." I am inclined to think there may be three species of *Platygenia*.

Amongst the *Buprestidæ* occur two apparently undescribed species of the genus *Sternocera*, Eschscholtz. Of a species nearly allied to one of these, two specimens already exist in our collection, brought by Dr. Burchell from S. Africa, to which the MS. name of *Buprestis liturata* has been applied by that enterprising and learned traveller. The following specific character may distinguish it from the *Sternocera interrupta*; it is, like all its congeners, variable in size; the least specimen is 1 inch 5½ lines, the largest 1 inch 7 lines.

The thorax is more coarsely punctured than in *S. interrupta*, and not so much so as in *S. castanea*; the abdomen beneath has also only a few slight hairs on its general surface, and the four last segments have on each side, between the side and middle, a patch of close-set hairs; that on the anal segment elongated. In Dr. Burchell's *S. liturata* the elytra are differently sculptured, showing symptoms of ridges; the spots are smaller, especially the hind ones. My species may turn out a local variety of this; meanwhile I describe it as

Sternocera liturata (var. *Currori*). St. ænescenti-nigra, thoracis lateribus singulis plaga magna depressa tomentosa (sub pilis super-

ficies æneo-viridis est), antice recta, postice rotundata, marginem posticam non attingente lateribus parallelis ; elytris singulis plagis 5, depressis pilis adpressis flavescenti-cinereis indutis ; 3 parvis basalibus, una elongata laterali, pilis longioribus duabus subovalibus juxta suturam, una submediana ad latus alteraque maxima, postice attenuata.

Hab. ad ripas fluminis Zaire. Dom. Curror collegit. Long. unc. 1. lin. 7.

By Laporte and Gory this would be regarded as a distinct species, although eventually I believe it will be found to be a local variety of *Sternocera liturata.* I have much pleasure in dedicating this handsome *Buprestis* to Mr. Curror, Surgeon of the Royal Navy, while to Mr. Burchell's I have assigned the name of *Sternocera liturata* (var. *Burchellii*).

Another *Sternocera*, of a bright purplish opalescent colour, and nearly allied to *S. castanea*, may be characterized as follows :—

Sternocera feldspathica. St. castanea, purpureo et viridi resplendens, thorace lateribus plaga antica subtriangulari, dorso rude punctato, elytris haud plagiatis lineatis, basi subareolatis, corpore subtus purpureo-nigro, subpiloso, segmentis 3 posticis lateribus, plaga pilorum.

Hab. ad oras Zaire vulgo Congo. Dom. Curror lexit. Long. unc. 1. lin. 7.

Mr. Curror has also brought from the Congo a specimen of

Chrysochroa lepida, Lap. et Gory, Hist. Nat. et Iconogr. des Ins. Coleopt. pl. 3. f. 9.

Buprestis lepida, *Gory*, Ann. Soc. Ent. de France, i. p. 383. pl. 12.
Buprestis dives, *Dej.*, Cat. p. 85 (ed. 1837).

And of the

Buprestis viridi-azurea. B. æneo-rufescenti-viridis, lateribus elytrorum sulculo depresso, thorace æneo, plagis variis subelevatis viridibus, corpore subtus æneo. Long. lin. 11.

I know not who applied the MS. name to this; it is closely allied to *Buprestis limbalis,* Illiger. Lap. et Gory, *op. cit.* p. 78. pl. 20. fig. 104. Our specimen came from Mr. Children's collection : the label is in Bilberg's handwriting.

Mr. Curror has brought amongst the Heteromera a specimen of what I consider to be a local variety of the

Epiphysa flavicollis, Dej., Cat. p. 197 (*Leachii* olim) ; Solier, Ann. Soc. Ent. de France.

Pimelia flavicollis, *Fabr.*, Ent. Syst. ; Syst. Eleuth. i. 128.
Pimelia inflata, *Oliv.*

Hab. ad oras fluminis Zaire.

An *Adesmia* with verrucose elytra, in form somewhat resembling *Pimelia cothurnata* of Klug (Ehrenberg's *Symbolæ Phys.*) is in Mr.

Curror's collection, but not having the volume of the French Ent. Soc. Annals which contains Solier's descriptions, by me, I fear to describe this and another *Pimelia* from the Congo, also seemingly new. I may here mention, as it is not altogether out of place, that the *Moluris Pierreti* of Serville, described by M. Amyot in Guerin's 'Magazin de Zoologie,' 1835, pl. 129, seems to me synonymous with the *Moluris vialis* of Burchell, two specimens of which, presented by Dr. Burchell, are in the collection of the British Museum. I subjoin Burchell's description and note, as the 'Travels in the Interior of Southern Africa' are not sufficiently known to entomologists. The synonym is inserted on my authority.

Sept. 12, 1811. *Note.*—"A black beetle was very often met with in our road, and seemed fond of crawling along the ground which had been made smooth by the wheels; for which reason, and its proving to be an undescribed species, I have called it

Moluris vialis, Burchell, Travels in the Int. of S. Africa, i. p. 305.
Moluris Pierreti, *Serville*, Amyot in Guerin's Mag. de Zoologie, 1835, pl. 129.

"Nigra. Elytra postice, et ad latera, tuberculata, apicibus productis glabris. Macula abdominalis velutina rufa. Thorax lævis.

"In its season it is a very common insect (about lat. 30° 20′ 47″), and, in a geographical view, one of a very wide range, but I believe quite extra-colonial*."

XXXV.—*Note on a Paper in 'Annals and Mag. of Nat. History,' vol.* vii. *p.* 315. By Mr. ADAM WHITE, M.E.SS. Lond. and Paris, Assistant Zool. Dep. British Museum.

AT p. 317 of my memoir on the nest of a South American wasp, I have said that it was found on "the banks of the Rio Yancay (Uruguay ?)." Walter Hawkins, Esq., of Fowkes Buildings, Lon-

* There are but few insects described in the notes to Burchell's Travels; one however I may mention, as it is alluded to as follows, and the passage contains a note on its habits: "Of insects I found two new species of *Anthia*, to one of which I gave the name of *effugiens*, on account of its very fast running, and of the great difficulty in catching it. This property is common, but in a degree something less, to all the species of this genus which I saw. This one is a transgariepine insect."—Burchell, *op. cit.* i. p. 417.

The entomologist knows this insect as the *Anthia homoplata*, described and figured by Dupont in his monograph of the genus in Guerin's 'Magazin de Zoologie,' 1832, pl. 39.

Mr. Burchell well merits the compliment of having an *Anthia* named after him, as has been done by the Rev. F. W. Hope in Griff. 'Anim. Kingdom,' Insects, i. p. 270. pl. 13. f. 1. (*Anthia Burchellii*): it is the *Anthia excæcans* of Burchell's MS.

don, who presented this nest to the national collection, has written to me that it was on the banks of the "*Nancay, a tributary stream of the* Uruguay," that the nest was found. He has sent me the accompanying note, which, as it contains some matter that may prove interesting to the curious, I here insert, only premising that I informed Mr. Hawkins that it was a wasp and not a bee that constructed it, as he originally suspected. It was the opinion of the late Professor Audouin, that the *Myrapetra scutellaris* (Ann. and Mag. *l. c.*) was, like *Nomada, Psithyrus,* &c. among the bees, a parasite, and that the wasp constructing it was as yet unknown. As far as I can at present see, I know not the grounds for this opinion of the learned and amiable French naturalist.

"A wasp's nest with a portion of wild honey in it was discovered in June 1837 in the woods situated along the banks of the 'Nancay,' a tributary stream of the 'Uruguay,' which takes its rise in the province of 'Entre-rios.' The 'Uruguay' joins the 'Paranà' a few miles above Buenos Ayres, and forms the 'Rio de la Plata.' This nest was cut off from the living branch of a tree, wherefrom it hung suspended at the height of about seven feet from the ground, by John Whitaker, plumber and steam-apparatus-maker, and Matthew Lawrance, his foreman. The apertures for ingress and egress have been constructed with admirable ingenuity in order to prevent the entrance of rain, which is carried off by a pent-like projection near the avenues to the cellular cavities.

"The principal materials whereof this nest is constructed, are the excrement of the Carpincho and dried rushes and underwood. The Carpincho is a species of Tapir or Water Hog, and is amphibious; they are very numerous on the banks of the Uruguay, and are preyed on by the tigers" [jaguars? *Felis onca.*]

"The tiger is the most powerful enemy the wasps have to deal with, for he springs upon the well-stored nest, and notwithstanding its height, very frequently succeeds in dashing it to the ground; he then shields himself in the thick foliage of the underwood from the stings of the enraged wasps, who usually migrate elsewhere in quest of another home. The tiger then, unmolested, returns to the fallen and deserted nest and devours the honeycombs: the scattered fragments of wasps' nests, thus destroyed by the feline and ferocious inhabitants of the forest, are frequently met with.

"Extreme length, including the twig on which the nest is suspended, 21 inches. The length of the nest is 17 inches, and its depth 11."

XXXVI.—*On the British* Diatomaceæ. By John Ralfs, Esq., M.R.C.S., Penzance*.

[Continued from p. 111.]

[With a Plate.]

The frustule in most of the *Cymbelleæ* consists of three portions. The central one is continuous and surrounds the internal colouring matter, and is generally compressed so as to have two surfaces and two ends. The lateral portions are most frequently nearly flat, corresponding to the septa between the joints of the *Conferveæ*; but sometimes they are convex, and then appear on a front view as in *Achnanthes*. In *Isthmia* they are still more developed, and being compressed, look as if they belonged to the front of the frustule.

Striæ which may be present on either the central or lateral parts commonly terminate in puncta or dots. On the central portion they are longitudinal and continued round the ends, are in general strongly marked, and often assist in distinguishing the genera. On the lateral surfaces the striæ are always transverse, less distinct, and frequently numerous and crowded. Sometimes they are very faintly marked, but the more powerful the microscope used in the examination, the greater will be the number of species found to possess them. On this account it is extremely difficult to pronounce whether a species has them or not; and therefore, although they may sometimes assist in the discrimination of species, their absence or presence will not sufficiently distinguish genera.

Isthmia, *Ag.* (*Eh.*)

Filaments attached; frustules oblique, trapezoid, cellulose, cohering at the angles by small processes.

This genus is easily distinguished by its cellulose structure from all the neighbouring genera, except *Biddulphia* and *Amphitetras*, which agree with it in having the frustules reticulated; but differ inasmuch as their frustules are not oblique, and all the angles are elongated†.

The frustules vary in form, but are always more or less oblique; there is a process at one of the lower angles of each by which it coheres to the next, and in the basal frustule this process forms the stipes by which the plant is attached to other Algæ. The frustules are turgid, and the reticulations of the central portion

* Read before the Botanical Society of Edinburgh.

† To the distinguished botanist M. Montagne, I am indebted for a few frustules of an *Isthmia* from Cayenne (*Isthmia polymorpha*, Mont.), which in some degree connects this genus with *Biddulphia*. It is very minute; the reticulations are obscure, and the frustules are sometimes slightly produced at each of the four angles.

are smaller than those of the sides. On each side of this central portion are seen the lateral surfaces, with their reticulations and striæ arranged transversely. As these lateral surfaces are turgid and compressed, they appear at first sight to form part of the front of the frustule. This may be observed in some slight degree in *Diatoma vulgare,* but not to the same extent as in this genus.

That it is in fact a portion of each lateral surface which is thus seen in front will be found on a careful examination of the exterior; but it is still more evident on a view of the interior of a fractured frustule, when the junctions of the sides with the central portion, marked externally by mere lines of separation, form internally projecting plates or rims.

The mode of growth in this genus is very curious. In *Diatoma,* as well as in most of the *Diatomaceæ,* the plant increases by a division of the frustules; but in this genus, and also in *Biddulphia* and *Amphitetras,* two new frustules are formed within the old one, and, as they enlarge, rupture it, when it falls off. In these the front portion is at first very narrow and merely a broad line, but it increases greatly in breadth until the new frustules are fully formed.

1. *I. enervis,* Eh. Frustules generally much broader than long, the sides with large reticulations, not striated, or else with the striæ between each row of cells. *Isthmia enervis,* Eh. Die Infus. p. 209. t. 16. f. 6; Pritch. Infus. p. 223. f. 183. *Isthmia obliquata,* Hook. Br. Fl. p. 405; Harv. Br. Alg. p. 201. *Isthmia obliquata, β tenuior,* Ag. Consp. Diatom. p. 55. *Biddulphia obliquata,* Gray, Arr. p. 294. *Conf. obliquata,* E. Bot. t. 1869.

β. subcylindrica.

Ballywater, co. Down, Ireland, *Mr. Thompson*; Torquay and Ilfracombe, Devonshire; Bracelet Bay near Swansea.

β. Torquay, *Mrs. Griffiths.*

Ehrenberg considers the 'Eng. Bot.' figure to belong to the next species, but I have no doubt that it is intended for this plant, of which it is a very good representation. The highly magnified figures in 'Eng. Bot.' undoubtedly represent it; those that are less magnified are too broad for the frustules of his *I. obliquata,* whilst under a low power this species appears striated like them.

The trivial name *obliquata,* which was originally applied to this species, should I think have been retained; but, on account of the celebrity of Ehrenberg's work, I have not thought it expedient to change his name.

Under this species, as I am informed by Mr. Dalrymple, Ehrenberg gives no synonyms and only one habitat,—Gothen-

berg. I believe, however, that most of the habitats assigned by him to *I. obliquata* will prove to belong to this species.

The frustules are generally from two to three times broader than long, but sometimes they are nearly equal in length and breadth. This is more particularly the case in the newly-formed frustules. The front or "broad transverse band" of British works generally occupies from one-quarter to one-third of the frustule, and its reticulations are roundish and very much smaller than those of the sides. This portion is separated from each lateral portion by a rather broad line formed by the junction and inflection of the two portions. The cells bordering on this line are not remarkably larger than the other cells in this band.

The cells in the lateral surfaces are of a square form and are arranged in regular transverse lines separated from each other by pellucid lines, which viewed from within form ridges and are as truly striæ as those in the next species, and under a low power the frustule appears with numerous close striæ as seen in the figure in 'Eng. Bot.,' which I have already referred to this species.

Mrs. Griffiths has sent me two forms from Torquay; one like that described above, the other with frustules much smaller and broader, and so turgid as to be nearly cylindrical. Of this latter I have seen but a very small portion, and am uncertain whether it is a young state of this species or wholly distinct.

Plate VIII. fig. 1. *a, Isthmia enervis*; *b*, variety *β*.

2. *I. obliquata*, Ag. (Eh.) Frustules rather broader than long, the front with a series of large cells along each separating line, the sides with but few and rather distant striæ. *Isthmia obliquata*, Eh. Die Infus. p. 209. t. 16. fig. 5; Pritch. Infus. p. 223; Ag. Consp. Diatom. p. 55?; Kutz. Synop. Diatom. in Linnæa 1833, p. 579. t. 16. fig. 69?

Carnlough Bay, co. Antrim, *Mr. Moore*, *Dr. Drummond*, and *Mr. Thompson*. *Mr. Moore* has also gathered it in the co. of Wicklow.

This and the preceding species have been so confused, that I quote the above synonyms with some doubt. Ehrenberg considers Kutzing's figure to belong to this species; and as it exhibits series of larger cells bordering the separating lines, I have quoted it under this plant, but I am by no means certain whether it is intended for it.

On examining recent plants of *Isthmia* gathered at Ilfracombe in October last, it appeared to me that all my specimens belonged to *I. enervis* of Ehrenberg and not to his *I. obliquata*, and Mr. Dalrymple having compared one of them with Ehrenberg's figure, ascertained that my supposition was correct. About the same time a very valuable packet of Irish *Diatomaceæ* was sent to me by Mr. Moore, amongst which I was much pleased to find

the real *I. obliquata* of Ehrenberg. I afterwards received from Mr. Thompson the same plant gathered at the same habitat.

The same confusion of the two species seems to prevail abroad, as a specimen sent me by Mrs. Griffiths, gathered in Sweden by Dr. J. E. Areschoug, who calls it *I. obliquata*, is undoubtedly the *I. enervis*. As the two species when compared are very distinct, their confusion may perhaps be in great measure owing to the mistake of Ehrenberg in referring the figure in 'Eng. Bot.,' and also all the habitats recorded before the publication of his work, to his own *I. obliquata*.

The frustules are usually not so wide in proportion to their length as in *I. enervis*; they are generally a little broader than long, often about equal, and I have sometimes observed them even rather longer than broad: in other respects their shape resembles the preceding species.

In the central portion, close to the lines which separate it from the lateral portions, is a single series of large reticulations, in shape somewhat triangular and having their base next to the lines: in this way a beautiful beaded appearance is produced. The sides have the reticulations much smaller than in *I. enervis*, less square, and not arranged so regularly in lines. They have also a few rather distant but conspicuous transverse striæ; not, as in *I. enervis*, alternate with the reticulations, but containing from two to four irregular series of reticulations between them: this latter circumstance, combined with the more minute reticulations and broader lines, gives this species so much more decidedly the appearance of being striated. The striæ frequently anastomose.

PLATE VIII. fig. 2. *Isthmia obliquata.*

BIDDULPHIA, *Gray*.

Filaments attached; frustules siliceous, quadrilateral, minutely reticulated, cohering by their alternate angles, and thus forming a zigzag chain; the angles are equal and elongated into tooth-like projections.

Agardh founded his genus *Odontella* upon *Diatoma auritum*; in that plant however I am unable to find any character by which it may be distinguished as a genus from *Biddulphia*. It is fortunate that the latter name has a prior claim, as it will prevent the confusion which might otherwise arise, as Ehrenberg and Meyen have applied Agardh's name *Odontella* to a genus belonging to the *Desmidieæ*.

I have already observed under *Isthmia* that its structure is similar to that of the present genus. *Biddulphia*, like that genus, has reticulated turgid frustules, which cohere by the elongated angles. *Biddulphia* has also the lateral portions so inflated that

they seem a part of the front of the frustule, the central portion appearing like a band between them. The mode of growth in this genus is also similar, but it differs in having all the angles elongated and equal.

The filaments are attached by one of the angles of the basal frustule. At first the frustules are connected with each other at both the adjoining angles, and as these angles are elongated, a small vacant space is inclosed between the connecting processes of the frustules. Ultimately, and after a partial separation has taken place, they cohere only by the alternate angles and form a zigzag chain.

1. *B. pulchella*, Gray. Frustules distinctly reticulated; lateral surfaces with one or three rounded projections between the angles, and marked with a few distant striæ, which appear to arise from the depressions between the projections. Gray, Nat. Arr. of Br. Plants, vol. i. p. 294 : Kutz. Syn. Diatom. p. 610. *Diatoma Biddulphianum*, Ag. Consp. Diatom. p. 54; Harv. Br. Alg. p. 201. *Conferva Biddulphiana*, Eng. Bot. t. 1762! (upper figures)*.

Southampton, *Miss Hill*; Ilfracombe.

It is brownish when recent and becomes paler in drying.

Filaments elongated, attached; frustules generally broader than long, but varying much in figure as the central portion, which is at first very narrow, gradually increases in size until it becomes broader than long. The lateral portions have at least one, and sometimes in the larger specimens three rounded projections, between the angles. None of these project so much as the angles, and the central one is larger than the others, which are often nearly flat. From the intervals between the projections, striæ proceed to the line which separates the central portion from the lateral one; generally these striæ are single, but sometimes two proceed from the same point and diverge from each other as they approach the central portion. The striæ are often united by irregular anastomosing lines; there is frequently also a line surrounding the base of the projecting angles. Between the striæ the lateral portions are cellulose, exactly like the central.

This cellulose structure is easily observed under a moderate power of the microscope. The angles are rounded, and occasionally constricted at their base, but more frequently not so. There is no constriction at the junction of the lateral portions with the central one.

This species is a most beautiful microscopic object.

Plate VIII. fig. 3. *Biddulphia pulchella*.

2. *B. aurita*. Frustules very minute; cellulose structure indistinct; lateral portions without striæ. *Diatoma auritum*, Lyngb.; Ag. Syst.

* The lower figures seem to have been drawn from *Diatoma teniæforme*.

p. 6; Grev. in Hook. Br. Fl. p. 404; Kutz. Syn. Diatom. p. 585. *Odontella aurita*, Ag. Consp. Diatom. p. 56; Harv. Br. Alg. p. 201; Berk. in Eng. Bot. t. 2842. fig. 2. (excellent).

On marine algæ. East-Bourne, Sussex, *Mr. Jenner*.

Frustules very minute, quadrilateral, varying from nearly square to twice as long as broad. This difference depends upon the breadth of the central portion or band, which is narrowest in the newly-formed frustule, and broadest at the time two new frustules are formed, whilst the lateral portions remain nearly of the same size in all the stages of growth.

The reticulations of the frustules are so very minute, that they can only be perceived by employing the highest power of the microscope after the colouring matter is removed*.

The lateral portions are constricted at their junction with the central one, and are destitute of striæ; I have never seen more than one convex projection between the angles, which are also more elongated and less rounded at the point than those of the preceding species.

It will be observed that this species differs from *pulchella* in the same manner as *Isthmia enervis* does from *I. obliquata*, namely in the absence of striæ. But *Biddulphia aurita* also differs from *B. pulchella* in its smaller size, in the obscure reticulations of the frustule, and by the constriction at the junction of the lateral portions with the central one.

A specimen of this species from the Cape of Good Hope, given me by Mr. Harvey, has the cellulose structure rather more evident than the Sussex specimens.

Plate VIII. fig. 4. *Biddulphia aurita*.

Amphitetras, *Eh.*

Filaments 4-sided; frustules reticulated, cubiform, cohering by one of the angles and forming a zigzag chain.

Filaments attached by one of the angles of the basal frustule; frustules cubiform, rectangular, or more frequently with all the angles slightly produced, reticulated, cohering irregularly by one of their angles so as to form a zigzag chain.

This genus agrees with *Isthmia* and *Biddulphia* in the reticulated structure of the frustules; in the great size of the lateral surfaces, between which the central portion appears like a band; in the produced angles, which are situated entirely in the lateral portions; and in cohering at the angles and thus forming a zigzag chain. It also agrees with these genera in their peculiar

* Mrs. Griffiths employs nitric acid for the purpose of removing the colouring matter. This method is on some accounts preferable to that of burning, especially as it is less liable to injure the frustules; it takes however more time, whilst the other requires only a few minutes.

mode of growth already described, two new frustules being gradually formed within the old one; but it differs from *Isthmia* in having all its angles equal, and from both in having a four-sided and not a compressed figure.

1. *A. antediluviana*, Eh. Frustules nearly square, lateral surfaces with the cells arranged in a radiate form. Pritch. Infus. p. 442.

Parasitic on the smaller marine algæ. Ilfracombe, Devonshire; and by the Mumbles Light-house near Swansea.

It is of a dirty-brown colour when recent and becomes paler in drying.

Filaments elongated, frequently containing thirty frustules in a chain; frustules minute, nearly equal in length and breadth; each lateral portion has four slightly produced angles and no intermediate projections, and its cells are rather large and somewhat radiate.

On a lateral view the figure is quadrangular with concave sides, and at each angle there is either a round opening, or a large and more strongly marked cell which presents the appearance of one.

The central portion is four-sided, and its reticulations, which are smaller, are frequently arranged in lines.

Mrs. Griffiths aptly compares the figures of the separated frustules to bales of cloth made up with bands for exportation.

Plate VIII. fig. 5. *a*, *Amphitetras antediluviana*; *b*, frustules deprived of their colouring matter; *c*, lateral view.

[To be continued.]

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

Nov. 22, 1842.—Wm. Yarrell, Esq., Vice-President, in the Chair.

The following descriptions of new species of *Nerites*, collected by Mr. Cuming in the Philippine Islands, by M. C. A. Récluz, were read.

Observation.—By length is meant the distance from the summit of the spire to the external base of the columella; by breadth, the diameter formed by the extremities of a line which should pass from the anterior to the posterior side; and by convexity or thickness, the distance comprised between the most convex parts of the columella and of the last whorl.

Second Section of the Genus.—Shells smooth, or striated lengthwise; outer lip without teeth and without furrows internally; columella not notched at the summit; columellar lip sharp, or crenulated at the margin. *Neritina*, Lamarck.

* Orbiculatæ seu subhemisphæricæ.

1. Nerita labiosa (Sowerby). *N. testâ orbiculari, posticè angustatâ, fornicatâ, crassâ, maximâ, striatâ, fusco-viridescente, nigro et rufo obsoletè variegatâ; anfractibus duobus ad suturam com-*

pressis; apice compresso-concavo; aperturâ orbiculari, subcontinuâ, intùs albidâ; labio latissimo, depresso-plàno, fusco-aurantio, margine subarcuato, edentulo; labio rotundato, supernè et infernè dilatato.

Var. β. *Testâ nigrescente, immaculatâ.*

Long. 1·52; lat. 1·84; conv. 1·04 poll. Aperturæ altitudo 1·52; lat. 1·60 poll.

Hab. Ad Insulas Philippinas; Tanhay, isle of Negros: in a small river. Var. β, Agoo, province of Pangasinan, isle of Luçon: on stones in a rapid river.

Two pyriform muscular impressions, and more forward than in any other species, are visible at the internal base of the columella, which has no trace of callosity.

The upper tooth of the operculum is oblique, lamellated, with a strongly-cut crest, a character which is unique in the genus *Nerita.*

2. Nerita squamæpicta. *N. testâ ovato-subhemisphæricâ, supra medium vix depressâ, striis longitudinalibus remotis supernè et anticè subarcuatis impressâ, sub epidermide olivaceo maculis squamiformibus anticè nigro-marginatis undique pictâ; apice rotundato-obtuso; aperturâ extùs ovatâ, intùs albido-cærulescente; labio plano, lutescente, medio albo, anticè tenue arcuatim denticulato.*

Long. 1·16; lat. 1·44; conv. 0·88 poll.

Hab. Agoo, province of Pangasinan, isle of Luçon: in a rapid river.

Operculum similar to the Nerites, allied to *N. pulligera*; subconvex above, finely striated lengthwise, of a whitish fawn-colour posteriorly; rosy anteriorly, streaked with circular bands of a blackish blue; subconcave below, of a dirty green, spotted with rosy white at the anterior side. Two teeth: the upper one ovate, acute at the summit, reddish; the lower one circular, canaliculated lengthwise, feebly striated transversely, yellowish.

3. Nerita Petiti, Récluz, Rev. Cuv. 1841. p. 274. No. 24.

Var. β. *T. majori, fusco-castaneâ; infimè et supernè ad suturam compressâ et subcanaliculatâ; spirâ retusâ.*

Var. γ. *T. minori, fusco-nigrescente, sub oculo et lumine maculis nigris diversiformibus notatâ; aperturâ subrotundâ, supernè et infernè dilatatâ, intùs aurantiâ.*

Long. 1·40; lat. 1·96; conv. 1·16 poll.

Hab. Cagayan, province of Misamis, island of Mindanao: on stones. Var. γ, Agoo: in a mountain-stream.

The operculum of this species differs from that of *N. pulligera* only in its paler colour.

4. Nerita asperulata. *N. testâ ovato-ellipticâ, striis intertextis granulosis asperulatâ, fusco-nigrâ, sub oculo et lumine, lineis nigris ramosis transversis intricatis notatâ; anfractibus 1½, supernè depressis; apice prominulo, obtuso; aperturâ rotundatâ, supernè et infernè dilatatâ, luteo-fuscescente; labio plano-compresso, margine vix arcuato et tenue ruguloso.*

Long. 0·56; lat. 0·76 ad 0·84; conv. 0·40 ad 0·44 poll.

Hab. Pasaguing, province of North Ylocos, island of Luçon: on stones in a small river.

The operculum of this species does not differ from that of *N. pulligera,* except in its colour, which is of a brownish black, faintly and indistinctly striated with fawn-colour from the summit to the anterior margin; the striæ often scarcely apparent.

5. Nerita Panayana. *N. testâ parvâ, ovato-hemisphæricâ, ventricosâ, posticè angustatâ, tenui; luteo-viridescente, lineolis nigrescentibus angulato-flexuosis creberrimis pictâ; anfractibus* $1\frac{1}{2}$ *supremo eroso-retuso; aperturâ extùs orbiculari, intùs dilatatâ, albido-cærulescente; columellâ semi-lunari planâ, albâ, anticè rectiusculâ.*

Long. 0·28; lat. 0·40; conv. 0·20 poll. Apertura altit. et diam. 0·28 poll.

Hab. River Dingle, province of Ylo-Ylo, island of Panay: on small stones.

Operculum unknown. This species resembles some varieties of *Ner. dubia,* but differs from them by its form and by its spire; also in the absence of any depression at the inferior margin of the columella.

6. Nerita crepidularia (Lamarck).

Var. *major. T. hemisphæricâ, crassiusculâ, dorso fornicatâ, purpureo-nigrescente maculis quadratis luteis tessellatâ, aperturâ extùs continuâ pallidè cinnamomeâ; labio subplano, in medio longitudinaliter arcuatimque sulco notato, anticè arcuatim crenulato.*

Long. 0·80; lat. 1·04; conv. 0·60 poll.

Hab. Jimmaymilan, isle of Negros: found on the trunks of the Nepa Palm, in brackish water.

I do not see in the characters of this Nerite anything to cause its separation from the *Neritina crepidularia,* Lam.; *N. mitrula,* Menke, 'Synopsis,' p. 48; nor from the *N. violacea,* Gmelin, if it is not its larger proportions. I presume that the *Patella neritoidea,* Linn., Mus. Lud. Ulr., p. 688. No. 409, is the same shell, worn and occupied by a *Pagurus.*

7. Nerita Rangiana, Récluz in Guérin, Rev. Cuv. 1841. p. 339. No. 46.

Var. *minor. T. pulchrè viridi, punctulis albis, anticè nigro marginatis, transversim* 2–4 *seriatis, ad suturam maculis albis subarcuatis lacteis ornatâ.* An *Ner. viridis,* Sowerby, Conch. Illustr., f. 24?

Long. 0·23; lat. 0·24 poll.

Hab. Dumaguété, island of Negros: found in a small stream.

Operculum green, slightly concave above, finely striated lengthwise, with two other circular striæ from the summit to the posterior margin; very convex underneath, hollowed at the posterior side for the insertion of the muscle, and provided with two teeth at the top; the upper one very short, lamellated, and truncated at the summit; the second circular, equally short, dilated into a sort of plate on the

side of the summit of the operculum, which gives to this tooth a lanceolate form.

The figure published by Mr. Sowerby under the name of *Neritina viridis*, Linn., and which this author says inhabits Antigua, appears to me to be the same as *Ner. Rangiana, var. minor*; but as I have only his figure to guide me, I cannot state it as a fact.

8. Nerita pulligera, Linn., Lamarck (non Lesson, Voy. Coq.).

Var. β. *T. labio posticè aucto.*

Hab. Cagayan, island of Mindanao: on stones in a deep river.

This prolongation of the posterior border of the columella renders this variety remarkable. This Nerite may possibly be found hereafter biauriculated.

** Auriculatæ.

9. Nerita subauriculata. *N. testâ ovato-hemisphæricâ, convexâ, fusco-violascente, punctis albido-lutescentibus densè aspersâ; apice brevissimo; aperturâ extùs ovatâ, posticè truncatâ, continuâ, plumbeo-nigrescente, dilatatâ; columellâ convexo-depressâ, sulco obsoleto circumcinctâ, anticè vix arcuatâ, denticulatâ; labro supernè in auriculâ brevissimâ prolongato.*

Long. 0·52 ad 0·56; lat. 0·68 ad 0·72; conv. 0·32 ad 0·40 poll.

Hab. Jimamailan, isle of Negros: on the Nepa Palm trunks in brackish water.

This *Neritina* is very nearly allied to *Ner. violacea*, Gmel., but is smaller, less convex, with the summit more inclined towards the margin; the opening truncated posteriorly, dilated at the summit and at the base, and auriculated on the superior side. The operculum does not differ materially; it is a little darker above, with a flesh-coloured zone on the middle, visible only at its base.

10. Nerita bicanaliculata. *N. testâ ovatâ, posticè truncatâ, dorso convexâ, tenui, pellucidâ, fuscescente, lineis violaceo-nigris, crebrè et eleganter reticulatâ; apice brevissimo, dorso interdum compresso plano; labio lato, subconvexo, margine arcuatim tenue denticulato; labro posticè biauriculato; auriculis angustis, subtùs canaliculatis.*

Var. β. *T. fuscescente, lineolis obsoletis, interstitiis interdum conico-angustis; spirâ integerrimâ, punctiformi; auriculis concaviusculis, aperturâ pallidè fuscâ.*

Var. γ. *T. pallidiore, vix reticulatâ.*

Hab. Island of Camiguing: found in a small pond. Var. β, Passiguing, province of North Ylocos: on stones in a rapid river. Var. γ, Abulug, province of Cagayan: on stones in a large river.

A fine *Neritina*, very distinct from all the auriculated species hitherto known. Its auricles are narrow, convex above, and hollow beneath, or in form of a short canal.

Operculum oval, flat above, flesh-coloured, and radiated from the summit to the anterior side with five to seven blackish lines; the anterior side bordered with a blood-coloured zone, enclosed by another pellucid zone; very fine striæ spring from the summit, and radiate to the anterior side in an opposite direction to the bands.

Inferior surface less flat, pale rosy brown or reddish brown, as well as the teeth, which offer nothing particular, and which resemble those of the opercula of *Ner. pulligera* and other allied species. The operculum of var. β is of an uniform colour above, on account of its zones being confluent. That of var. γ is of a very pale green, with a circular stria, which divides its external surface in two parts almost longitudinally. This character is also observable upon the operculum of var. β, but very faintly. There is no trace of it upon the type.

*** Spinosæ, interdum muticæ (*Clithon*, Montfort).

11. Nerita olivacea. *N. testâ ovato-globosâ, ventricosâ, crassâ, griseo-olivaceâ, anfractibus* $2\frac{1}{2}$, *supernè depressiusculis; apice subconvexo, obtuso, laterali, in medio deroso; aperturâ extùs subquadratâ, intùs exalbidâ, labio posticè rufescente, plano, margine crenato, et in medio vix arcuato.*

Long. 1·12; lat. 1·36; conv. 0·76 poll.

Hab. Agoo, province of Pangasinan, island of Luçon: on stones in a rapid river.

This *Clithon* has sometimes a brownish zone posteriorly, with some faint reddish spots. The summit of the shell is corroded and excavated. Operculum of a *Clithon*, rosy white, spotted with red at the summit, and faintly marked with a circular streak in the centre of its external surface. The interior surface is reddish, convex, and flattened at the base; two teeth at the top, the upper one lamellated, elevated into an obtuse point; the second or inferior one circular and striated. Underneath this tooth there is a great depression.

12. Nerita bicolor. *N. testâ ventricoso-ovatâ, crassiusculâ, sub suturâ depressiusculâ, strigis nigris et olivaceis longitudinalibus densè pictâ; apice eroso; aperturâ extùs subquadratâ exalbidâ; labio plano, supernè calloso basi canaliculato, margine in medio arcuato, et obsoletè dentato; dente cardinali majori.*

Long. 1·04; lat. 1·20; conv. 0·76 poll.

Hab. Agoo: in a mountain-stream.

Operculum of a *Clithon*, oval, solid, whitish, striated lengthwise in an oblique direction, and marked with a circular furrow from the summit to the posterior margin, ending in a slight notch; inferior surface furnished with a large, circular, slightly raised rib, prolonged in an obtuse angle at the posterior margin. Two teeth at the top: the upper one an oblique rosy plate terminated at the summit; the lower one circular, delicate yellow, enlarged at the summit, and striated lengthwise and across.

13. Nerita interrupta. *N. testâ ovato-semiglobosâ, apice valdè corrosâ et truncatâ, olivaceâ, lineolis luteis interdum interruptis creberrimis et fasciis latiusculis luteis transversis pictâ; aperturâ extùs semi-ovali, intùs luteâ; labio subsemilunari, plano-concavo, margine in medio arcuato, acuto, dente cardinali exserto.*

Lat. 0·96; conv. 0·64 poll.

Hab. Yba, province of Zambales, isle of Luçon: on stones in a rapid river.

The flat and greatly eroded summit does not allow the form and length of the shell to be ascertained with exactitude. It appears to me to have at most a whorl and a half faintly depressed below the suture.

Operculum very like that of *N. bicolor*, but of a yellowish white colour externally. On the inferior surface I observe that the upper tooth is stronger; the lower one annulated transversely, in a more distinct manner. The intermediary plate is more compressed and less sinuous at the margin, and the notch at the posterior part appears to me to be deeper.

14. Nerita angulosa. *N. testâ ventricoso-globosâ, supernè depresso-planâ, subtùs angulosâ, olivaceâ, maculis luteis parvulis obsoletis notatâ; anfractibus duobus inæqualiter rugatis; supremo deroso-concavo, aperturâ subrotundatâ, anticè et posticè angustatâ, supernè et infernè dilatatâ; columellâ angustâ, medio concavâ, supernè callosâ, anticè tenuè denticulatâ, medio emarginatâ.*

Long. 0·72; lat. 0·92; conv. 0·60 poll.

Hab. Casan, province of Misamis, island of Mindanao: on stones in a small stream.

Operculum oval, waved with grey on the anterior side, with a narrow circular furrow ending in a strong posterior notch: this furrow bounds a superior, obtuse and circular angle. The summit of an orange colour; internal surface bearing a curved rib in the centre, of greater or less width. Superior tooth yellowish and obtuse; the inferior yellowish white and substriated lengthwise; the intermediary plate between the two teeth of a citron colour, cut obliquely at the margin. The depression existing at the base of the lower tooth is of a flesh-colour approaching to cinnamon.

15. Nerita circumvoluta. *N. testâ globoso-subovatâ, dilutè fulvâ in roseo vertente, punctis luteolis anticè lineis nigris marginatis marmoratâ, zonis nigris remotis circumcinctâ; anfractibus duobus nigro-marginatis; supremo obtuso, decorticato; aperturâ albidâ; labio plano, supernè calloso, anticè ruguloso, et in medio arcuatim emarginato.*

Long. 0·72; lat. 0·84; conv. 0·68 poll.

Hab. ad Insulas Philippinas.

Operculum of a *Clithon*, oval, of a rosy white, with a broad, rather concave and central furrow; on the interior face of a pale yellowish colour, shaded with rose. One lamellated and pointed tooth near the summit, and an inferior one, which is circular, subcanaliculated in the centre, and striated transversely.

16. Nerita squarrosa. *N. testâ ventricoso-globosâ, interdum subovatâ, supernè depressâ et subangulatâ, epidermide squarrosâ, maculis rufescentibus angulatis confertis nigro seu olivaceo marginatis pictâ, apice rotundatâ, aperturâ extùs subquadratâ, intùs albido-cærulescente; labio suprà lutescente, plano, anticè ruguloso, medio arcuato.*

Var. *β. T. subrubicundâ, nigro-fasciatâ.*

Var. *γ. T. roseo-purpurascente, albo-maculatâ, labio margine detrito.*

Var. δ. *T. roseo-purpurascente, albo-maculatâ, nigrescente fasciatâ; labio detrito.*

Long. 0·80 ad 0·84; lat. 1·04 ad 1·08; conv. 0·68 ad 0·76 poll.

Hab. Jimamailan, isle of Negros: on stones in a mountain-stream. Var. β, Ginijeran, isle of Negros: on stones in a sluggish river. Var. γ and δ, island of Burias.

Operculum of a *Clithon*, whitish or rather rosy externally, with one or two circular striæ in the centre; of a livid rose-colour, spotted with yellow on the interior. Two teeth: the first lamellated, pointed at the summit; the lower one circular, narrow, striated lengthwise and across, but faintly. Subapophysary canal spotted with livid rose, showing below two remote angles, but slightly raised.

17. Nerita Sowerbiana. *N. testâ subglobosâ, tenuè striatâ nigro et albido alternatim fasciatâ; fasciis nigris albo-articulatis, albidis maculis nigro-marginatis anticè sagittatis ornatâ; anfractibus tribus, convexis; spirâ vix prominulâ, rotundatâ; aperturâ obliquâ cinerascente; labio subconvexo, lutescente, anticè denticulato arcuatoque.*

Var. β. *T. cinereo-lutescente, maculis sagittatis ut suprà subzonatâ; ad suturam maculis arcuatis nigris ornatâ.*

Var. γ. *T. nigerrimâ, maculis triangularibus albidis adspersâ, ad suturam interdum subspinosâ.*

Var. δ. *T. nigerrimâ, maculis raris subpunctatâ, zonis duabus lutescentibus cinctâ, ad suturam subspinosâ.*

Long. 0·56 ad 0·60; lat. 0·64 ad 0·72; conv. 0·48 poll.

Hab. Sinait, province of North Ylocos, island of Luçon: on the stony bed of a small river. Var. β, γ and δ, island of Guimaras: found in a small stream on rocks.

Operculum of a *Clithon*, deeply hollowed with a circular stria in the centre, zoned transversely with bluish in the anterior portion of its external surface; the interior of a yellowish or livid rose-colour: upper tooth citron, short, obtuse, united to the lower one, which is smooth, circular, striated lengthwise and across by a short plate, which is subsinuous anteriorly.

I see no difference among all the varieties which I unite to this Nerite, except those of colour. The characters of the operculum are the same.

I have very great satisfaction in dedicating this species to that scientific conchologist, Mr. G. B. Sowerby.

18. Nerita Montacuti. *N. testâ ventricoso-globosâ, suprà medium spinis brevibus coronatâ, obliquè striatâ, lutescente, supernè et infrà medium zonis nigris lutescente maculatis pictâ; supremâ latiore; anfractibus tribus supernè depresso-planis; spirâ depresso-convexâ; aperturâ dilatatâ, rotundatâ, albido-lutescente; labio angusto, medio concavo, margine denticulato, in centro arcuato.*

Var. β. *T. olivaceâ, maculis lutescentibus adspersâ, ultimo anfractu supernè convexiusculo, labio denticulato.*

Var. γ. *T. dilutè olivaceâ, maculis pallidioribus nigro anticè sagittatis marginatisque; ultimo anfractu supernè subconvexo, labio edentulo, integerrimo.*

Var. δ. *T. nigerrimâ, punctis albis sparsis notatâ; labio denticulato.*

Var. ε.? *T. fulvâ, nigrescente tinctâ, sub oculo et lumine punctulis pellucidis obsitâ; spinis extrorsum curvatis; ultimo anfractu basis costulâ notato; spirâ vix prominulâ.*

Long. 0·76; lat. 0·80 ad 0·88; conv. 0·60 ad 0·64 poll.

Hab. Island of Burias: on stones in a rivulet.

I consider it my duty to dedicate this Nerite to the learned conchologist Montagu, as a homage due to his talents.

19. Nerita Donovani. *N. testâ semiglobosâ, tenuè et densè striatâ, viridescente, lineis obliquis purpureo-nigrescentibus, equidistantibus undatis ornatâ; anfractibus tribus convexis, supra medium spinis incurvis armatis; apice deroso; aperturâ cærulescente, basi effusâ, angulosâ; labio angusto, supernè calloso, basi concavo, margine subrecto denticulato; dente cardinali majori.*

Var. β. *T. ovatâ, nitidâ, maculis viridibus et purpurascentibus densè tessellatâ; spinosâ, ultimo anfractu supernè ascendente, basi costulâ transversâ notato; spirâ prominulâ.*

Long. 0·50; lat. 0·60; conv. 0·40 poll. Var. β, long. 0·56; lat. 0·60; conv. 0·44 poll.

Hab. Island of Guimaras: on stones in a small stream.

Whatever the difference of form and colour, it does not appear to me possible to distinguish these two shells otherwise than as varieties of the same type. Their operculum is unknown to me.

20. Nerita Michaudi, Récluz in Rev. Cuv. 1841. p. 315. No. 38.

Var. β. *T. tenui, lineolis nigris longitudinalibus rectis creberrimis, et maculis luteis lineâ nigrâ anticè cinctis concatenatis triserialibusque pictâ.*

Var. γ. *T. anfractibus supra medium spinis brevibus angustisque armatis.*

Hab. Bauang, province of Pangasinan, isle of Luçon: on small stones on the bank of a river.

21. Nerita pulchella. *N. testâ subglobosâ, nitidâ, vix striatâ, luteo-viridescente, maculis nigris sagittatis et zonis æqualibus remotis nigris lutescentè articulatis ornatâ; spirâ nullâ; apice convexo; aperturâ semi-rotundâ, cærulescente; labio angusto, subconvexo, supernè calloso, anticè subrecto, denticulato; dente cardinali majori.*

Var. β. *Testâ sordidè purpurascente, albo punctatâ et zonis cæruleo-viridescentibus albo-maculatis cinctâ.*

Var. γ. *Testâ purpurascente, maculis albis nigro sagittatis et zonis nigris albo-articulatis ornatâ.*

Var. δ. *Testâ rubicundâ, punctulis albis, anticè obsoletè purpureo-nigrescentibus, anticè marginatis marmoratâ; labro crassiore.*

Long. 0·36 ad 0·40; lat. 0·44 ad 0·48; conv. 0·32 poll.

Hab. Sual, province of Pangasinan, isle of Luçon: in a small stream.

Operculum of a *Clithon*, yellowish white, marked with a fine circular streak in the centre: two teeth at the summit of the interior face; the upper one short, yellow; the lower one circular, yellow,

striated lengthwise and across, sometimes dilated at the summit; the intermediary plate between the two teeth of a whitish colour.

December 13.—Prof. Rymer Jones in the Chair.

Mr. Gould, at the request of the Chairman, exhibited some new species of the genus *Ortyx*, which he thus characterizes:—

ORTYX NIGROGULARIS. *Ort. vertice et corpore superiore splendidè fuscis; strigâ nigrâ superciliari, a rostro usque ad occiput; et super hanc strigâ albâ; sub oculos lineâ albâ a rostro ad plumas auriculares, et per latera colli excurrente, gulamque nigram circumdante plumis pectoris et abdominis albis nigro marginatis angustè apud pectus, latè et distinctè apud abdomen, et sese squamatìm ostendentibus; femoribus crissoque arenaceo-castaneis; plumis lateralibus in medio albis.*

Crown and all the upper surface rich brown; margins of the tertiaries and wing-coverts fawn-colour; these feathers are also crossed with indistinct zigzag lines, freckles, and blotches of black and blackish brown; primaries greyish brown; tail deep bluish grey, the centre feathers and the external margins of the remainder freckled with reddish brown and buff; a black stripe, commencing at the base of the bill, passes over the eye to the occiput; above this a stripe of white; below the eye a white line from the base of the bill to the ear-coverts, down the sides of the neck, and encircling the throat, which is jet black; feathers of the chest and abdomen white, margined with a zone of black; narrow on the chest, broad and distinct on the abdomen; giving the under surface a scaly appearance; flanks, thighs and under tail-coverts sandy chestnut, the centre of each of the flank-feathers white; bill black; feet flesh-white.

Total length, 8 inches; bill, $\frac{9}{16}$; wing, $4\frac{1}{4}$; tail, $2\frac{1}{4}$; tarsi, $1\frac{1}{4}$.

Hab. Mexico; locality unknown. In the collection of the Earl of Derby.

Remark.—This species is of the same form and nearly of the same size as *O. Virginiana*.

ORTYX PECTORALIS. *Ort. vertice et nuchâ nigrescenti-fuscis; lineâ angustâ albâ frontali super oculos et per nucham ductâ; plumis auricularibus, colli lateribus, et pectore nigris; gulâ albâ; abdomine, lateribus et crisso, cervinis; plumis lateralibus inferioribus, ad apices nigro alboque guttatis dorso superiore, humeris scapulisque castaneis, tectricibus alarum, et caudæ, tertiariis, et dorso imo, cinereo-fuscis; plumis omnibus corporis superioris cervino pallidè marginatis, et punctatis.*

Crown of the head and back of the neck blackish brown; a narrow stripe of white crosses the forehead, passes over the eye, and extends down the back of the neck below the occiput; ear-coverts, sides of the neck and chest, black; throat white; abdomen, flanks and under tail-coverts fawn-colour; the tips of the feathers on the lower part of the flanks spotted with black and white; the upper part of the back, scapularies and shoulders, chestnut brown; wing-coverts, tertiaries, back and upper tail-coverts greyish-brown; all the feathers of the upper surface margined and speckled with very light fawn-

colour, which on the secondaries assumes the form of distinct bars; in addition to these marks the scapularies, secondaries, back and rump, are minutely freckled with brown; the strongly contrasted markings giving all the upper surface a bespangled appearance; primaries brownish-grey; tail-feathers bluish-grey; some of them freckled on the margin with buff; bill black; feet flesh-white.

Total length, 7 inches; bill, $\frac{1}{2}$; wing, 4; tail, $2\frac{1}{8}$; tarsi, $1\frac{1}{8}$.

Hab. Mexico; locality unknown. In the collection of the Earl of Derby.

Remark.—Of the same form, but smaller in size than *O. Virginiana.*

ORTYX CASTANEA. *Ort. fronte guldque nigris; lineá superciliari albá obsoletá usque ad occiput, et super hanc lineá nigrá vertice, nuchá, dorso superiore, humeris, pectore, et lateribus saturatè castaneis; uropygio, tectricibusque caudæ castaneis nigro irroratis, fasciatis, et punctatis; plumis abdominalibus albis, nigro undatìm fasciatis lateralibus, guttis albis suprà nigro cinctis, ornatis; his notis omnibus lucidis.*

Forehead and throat black; an indistinct line of white runs over the eye to the occiput, above this another indistinct line of black; crown of the head, back of the neck, upper part of the back, shoulders, chest and flanks, deep rich chestnut; the feathers on the sides of the neck with a black stripe down the centre and an oblong patch of white down the outer web; the tertiaries and some of the scapularies margined with deep fawn-colour, bounded within by an indistinct line of black; these feathers are also crossed with indistinct bars and freckles of black; rump and upper tail-coverts rich chestnut, minutely freckled, barred and dotted with black; feathers on the centre of the abdomen white, marked with strong zigzag bars of black, changing into spots of white, bounded above by black on the flanks, all these marks being very brilliant; eyelash dark olive; irides dark reddish hazel; bill black; legs yellowish white.

Total length, $8\frac{1}{2}$ inches; bill, $\frac{5}{16}$; wing, $4\frac{1}{2}$; tail, $2\frac{7}{8}$; tarsi, $1\frac{1}{4}$.

Weight $5\frac{1}{4}$ ounces and 20 grains avoirdupois.

Hab. South America; locality unknown. In my own collection.

Remark.—Rather larger in all its measurements than *O. Virginiana.* From the general appearance of this bird, Mr. Gould is led to believe that it may hereafter prove to be a variety of some other species, probably of *O. Virginiana*; at the same time its markings are so different and so decided in character that he has deemed it best to describe it provisionally, under a distinct appellation.

ORTYX (ODONTOPHORUS) STELLATA. *Ort. mas. gulá et collo cinereis, plumis rufo marginatis alis, plumisque scapularibus castaneo, cervino, et nigro pulchrè pictis; caudæ tectricibus, rectricibusque lineis undulatis alternatìm rufo-fuscis et nigris, ornatis, punctis, et guttis parvulis interspersis; pectore, abdomine, et crisso splendidè rufo-castaneis plumis pectoris guttá parvulá centrali albá angustè nigro ferè cinctá, perpulchrè pictis.*

Fœm. staturá minore, et notis albis pectoralibus magìs productis, et minùs conspicuis distinguendá.

Male.—Naked skin before and behind the eye yellowish; bill black; crest rather lengthened and full; forehead and ear-coverts clouded chestnut, the former passing into reddish chestnut on the crown, and gradually brightening towards the occiput; throat and neck both before and behind grey, all the feathers margined with rufous; scapularies and wings (except the primaries) beautifully marked with rich chestnut, buff and black, the black predominating on the scapularies, which feathers are rendered very conspicuous by having a whitish buff line down the centre; the tertiaries also are marked with a bold edging of rich buff, bounded on the inner side by a well-defined band of black, which surrounds the feather, while the buff occupies the upper edge only; at the tip of all the wing-coverts is a triangular spot of buffy white; primaries blackish brown, marked on their outer edge with indistinct but regular bars of reddish brown; back and rump dull greyish buff, each feather minutely dotted and freckled with brown and black; tail-coverts and tail rufous brown and black, the markings and colour so disposed that neither predominate, being dispersed over each feather in alternate narrow zigzag lines, interspersed with minute dots and freckles; chest, abdomen and under tail-coverts rich rufous chestnut; the feathers of the chest with a small white mark in the centre, very nearly surrounded by a narrow irregular line of black, giving it a very sparkling appearance; feet and legs in the dried specimen horn-colour.

Female.—Differs in being smaller in size and in having the small white markings of the chest, being more lengthened in form and less conspicuous than in the male; in all respects the colouring of the two sexes is generally similar.

	Male.	Female.
Total length	$10\frac{1}{2}$ inches.	$9\frac{1}{2}$ inches.
Bill	$0\frac{3}{4}$ —	$0\frac{5}{8}$ —
Wing	$5\frac{3}{8}$ —	$5\frac{1}{4}$ —
Tail	$3\frac{1}{4}$ —	$2\frac{1}{2}$ —
Tarsi	2 —	$1\frac{3}{4}$ —

This species is about the size of the Common Partridge. The specimens from which the above descriptions were taken are in the British Museum, to which they were presented by Lord Stewart; they are said to be from Brazil.

Specimens of new species of the genera *Trochus* and *Turbo* were also exhibited, and were accompanied by the following descriptions by Lovell Reeve, Esq.

Genus Trochus.

Trochus asteriscus. *Troch. testâ obeso-conicâ, viridescente, anfractuum margine squamoso-stellatâ, squamis, grandibus cavis, infimâ facie eximiè serratâ, serris linearibus, parallelis, circulatim dispositis; umbilico tecto, basi roseo-tinctâ.*

Reeve, Conch. Syst., vol. ii. pl. 217. f. 3.

Alt. $1\frac{1}{4}$; diam. $1\frac{1}{8}$ poll.

Hab. —— ?

This shell has the base of the columella stained with rose-colour, like the *Trochus rhodostoma*, Lamarck; there is no danger, however, of confounding it with that species; the under surface of the *Trochus asteriscus* is most elegantly serrated, the serræ ranging round with peculiar regularity; and the periphery of each whorl extends into large hollow spouted scales. The shell figured in 'Conch. Syst.,' at fig. 5 of the same plate, under the name of *Trochus pileolum*, appears, by a figure subsequently published in Delessert's 'Recueil de Coquilles,' to be the *Trochus fimbriatus* of Lamarck.

Trochus gemmosus. *Troch. testá parvá, conoideá, luteo et violaceo vividè variegatá; anfractibus leviter convexis, superficie ubique granulatá, granulis obtusis, quasi gemmosis; infimá facie similiter ornatá.*

Reeve, Conch. Syst., vol. ii. pl. 218. f. 9.

Alt. $\frac{3}{4}$; diam. $\frac{3}{4}$ poll.

Hab. —— ? Mus. Stainforth.

This is a most lovely shell to look upon; it is richly variegated with violet and yellow, and the surface being obtusely granulated, gives it the appearance of being studded with gems.

Trochus Hanleyanus. *Troch. testá acutè conicá, viridi, levissimè nodulosá; anfractibus planiusculis, peripheriá ultimi acutá; infimá facie roseo-tinctá, minutissimè serratá, serris regularibus, seriatim dispositis, umbilico parvo.*

Reeve, Conch. Syst., vol. ii. pl. 218. f. 11.

Alt. $1\frac{1}{2}$; diam. $1\frac{1}{4}$ poll.

Hab. —— ? Mus. Cuming.

By the above title I wish to keep in remembrance the name of my industrious friend Sylvanus Hanley, Esq.

Trochus modestus. *Troch. testá conoideá, roseo-aurantiá, tuberculiferá, subsquamosá; anfractibus convexis, tuberculis squamæformibus, irregularibus, in medio biseriatìm cinctis; umbilico tecto; basi aurantiá.*

Reeve, Conch. Syst., vol. ii. pl. 218. f. 14.

Alt. $1\frac{5}{8}$; diam. $1\frac{3}{4}$ poll.

Hab. —— ? Mus. Cuming.

This shell, which is of a peculiar rose-tinted orange-colour, has each whorl encircled with a double row of irregular scale-like tubercles.

Trochus eximius. *Troch. testá conico-pyramidali, pallidè carneolá, lineis transversis interruptis sparsim ornatá; anfractibus supernè concavis, in medio depresso-planis, bifuniculatis, funiculis albonigroque tessellatis; umbilico tecto.*

Reeve, Conch. Syst., vol. ii. pl. 218. f. 12.

Alt. $\frac{7}{8}$; diam. $\frac{3}{4}$ poll.

Hab. ad Payanam. Mus. Cuming.

Dredged from sandy mud at the depth of ten fathoms.

Trochus melanostoma. *Troch. testá depresso-conicá, cinereoviolaceá, fauce nigerrimá, anfractibus concaviusculis, marginibus acutis, infimá facie circulariter tæniatá; umbilico tecto.*

Reeve, Conch. Syst., vol. ii. pl. 218. f. 16.

Alt. $\frac{5}{8}$; diam. $\frac{3}{4}$ poll.

Hab. ad oras Novæ Hollandiæ.

The mouth of this shell is lined with a peculiarly black shining enamel.

Genus Turbo.

Turbo pulcher. *Turb. testá ovatá, ventricosá, multicostatá, luteo-viridescente costis lineolis nigricantibus hic et ubique pictá; anfractibus tumidis, ultimo valdè maximá, costis interstitiisque profusè et tenuissimè serratis.*

Reeve, Conch. Syst., vol. ii. pl. 219. f. 3.

Alt. $2\frac{1}{4}$; diam. $1\frac{7}{8}$ poll.

Hab. ——? Mus. Cuming.

The leading feature of this beautiful shell is, that the entire surface, both ribs and interstices, are very thickly and finely serrated.

Turbo Ticaonicus. *Turb. testá ovato-turbinatá, multicostatá, luteo-viridescente, strigis nigerrimis transversìm ornatá; anfractibus rotundatis, ultimo sublaxius voluto; costis irregularibus, latis et angustis, interstitiis tenuissimè serratis; umbilico parvo.*

Reeve, Conch. Syst., vol. ii. pl. 219. f. 6.

Alt. $2\frac{1}{8}$; diam. 2 poll.

Hab. ad insulam Ticao, Philippinarum. Mus. Cuming.

This shell was found by Mr. Cuming at the above locality in mud, at the depth of ten fathoms.

Turbo squamiger. *Turb. testá ovato-turbinatá, multisquamosá, luteo et viridi variegatá, anfractibus subtumidis squamis grandibus, cavis, seriatim dispositis, ubique cinctis.*

Reeve, Conch. Syst., vol. ii. pl. 220. f. 7.

Alt. $1\frac{3}{8}$; diam. $1\frac{1}{4}$ poll.

Hab. ——? Mus. Cuming.

The *Turbo squamiger* may be immediately recognised, as being entirely covered with large vaulted scales, arranged in regular parallel transverse rows.

Turbo variabilis. *Turb. testá ovatá, lævi, luteo- aut rubido-brunnescente variabilè variegatá; umbilico tecto.*

Var. α. Testá luteo-rubellá, fusco alboque variè nebulosá et tæniatá.

Reeve, Conch. Syst., vol. ii. pl. 219. f. 2.

Alt. 2; diam. $2\frac{1}{8}$ poll.

Hab. ad insulam Capul, Philippinarum.

Var. β. Testá rosaceo-rubrá, lineis tenuibus flexuosis albis, diagonaliter pictá.

Reeve, Conch. Syst., vol. ii. pl. 219. f. 1.

Alt. $1\frac{7}{8}$; diam. $1\frac{7}{8}$ poll.

Hab. ad insulam Capul, Philippinarum.

The general painting of these shells, which were found by Mr. Cuming at the above locality in deep water, varies considerably, some being richly clouded with brown and a warm yellow, whilst others are crossed with a number of fine white diagonal lines upon a

deep crimson ground. They approach nearest to the *Turbo petholatus*, differing, however, in a very remarkable degree in the character of the painting above noted. The riband-like bands, which form a never-failing peculiarity in that species, are wanting, and so also is the green or yellow tinge of colour which runs round the columellar side of the mouth.

Descriptions, by Dr. L. Pfeiffer, of some new species of *Helicidæ*, collected by Mr. Bridges in the northern parts of Chile, were then read:—

Bulimus Bridgesii. *Bul. T. subperforatâ, oblongo-ovatâ, apice obtusâ, tenui, pallidè luteo-fulvescente, confertissimè et leviter decussatâ; suturâ mediocri, marginatâ; anfractibus* 4 *convexiusculis, ultimo spiram superante; aperturâ ovali, intùs nitidè fulvidâ; peristomate simplice, latè reflexo, intùs albo, marginibus callo junctis, columellari perforationem ferè occultante.*

Long. $11\frac{1}{2}$; diam. $5\frac{1}{2}$ lin.

From the town of Frierina (Huasco, Chile). Found under stones.

Bulimus pachychilus. *Bul. T. subperforatâ, ovatâ, apice obtusâ, crassâ, albâ, longitudinaliter striatâ, lineis confertissimis transversis sub lente decussatâ; anfractibus* $4\frac{1}{2}$ *convexiusculis, ultimo* $\frac{3}{5}$ *longitudinis subæquante; aperturâ integrâ, ovali, intùs albâ; peristomate latè incrassato, pallidè fulvescente, nitido, marginibus callo crasso junctis.*

Long. $19\frac{1}{2}$; diam. 11 lin.

From La Questa de Arenas (Huasco, Chile). Found buried in sand.

Bulimus rhodacme. *Bul. T. perforatâ, ovato-oblongâ, longitudinaliter striatâ, striis transversis obsoletis minutissimè decussato-subgranulatâ, albâ maculis et flammis pellucidis rubellis ornatâ, apice obtuso roseo; anfractibus* 6 *convexis, ultimo* $\frac{1}{3}$ *longitudinis subæquante; aperturâ oblongo-ovali; peristomate simplice, recto margine columellari reflexo.*

Long. $7\frac{1}{2}$; diam. $2\frac{3}{4}$ lin.

From the town of Frierina (Huasco, Chile). Found under small *Cacti.*

Bulimus terebralis. *Bul. T. rimato-subperforatâ, subulatâ, longitudinaliter rugulosâ, albidâ, supernè fusco-cærulescente; anfractibus* $10\frac{1}{2}$ *planis, ultimo* $\frac{1}{4}$ *longitudinis vix superante, basi subcarinato; columellâ obsoletè plicatâ; aperturâ ovali intùs albâ; peristomate simplice, margine dextro dilatato, columellari reflexiusculo, supernè carinæ affixo.*

Long. $10\frac{1}{2}$; diam. $2\frac{1}{4}$ lin.

From Coquimbo (Chile). Found on rocks and plants near the sea.

Succinea elegans. *Suc. T. ovato-oblongâ, tenui pellucidâ, læviusculâ, rubello-corneâ, strigis longitudinalibus, opacis, albis, rufo-marginatis ornatâ; anfractibus* $5\frac{1}{2}$ *planiusculis, ultimo spiram acutam vix superante; aperturâ ovali-oblongâ, intùs nitidâ, concolore; peristomate simplice, margine columellari vix calloso.*

Long. 18; diam. $8\frac{1}{2}$ lin.

From the Questa de Arenas (Huasco, Chile). Found on a species of *Juncus*.

Succinea reflexa. *Suc. T. ovato-oblongâ, tenui pellucidâ, nitidâ, minutissimè granulosâ, corneo-sulphureâ, strigis irregularibus interdum ramosis, rufis ornatâ; anfractibus 5 planiusculis, ultimo spiram vix superante; aperturâ ovali-oblongâ, intùs albidâ, obsoletè strigatâ; peristomate simplice, acuto, margine columellari tenuissimo, albo reflexo.*

Long. $19\frac{1}{2}$; diam. $8\frac{1}{2}$ lin.

From Pichidanque, near Coquimbo. Found on the leaves of *Pourretia coarctata.*

Succinea variegata. *Suc. T. ovato-acutâ, solidiusculâ, longitudinaliter rugosâ, regulariter granulatâ, luteâ, maculis longitudinalibus et punctis nigricanti-rufis seriatìm pictâ; apice acuto; anfractibus $5\frac{1}{2}$ planiusculis, ultimo $\frac{4}{7}$ longitudinis subæquante; aperturâ oblongo-ovali, intùs nitidè albâ, strigis pellucentibus; peristomate simplice, acuto, margine columellari subcalloso.*

Long. 24; diam. $11\frac{1}{2}$ lin.

Valleys in the north of Coquimbo. Found in crevices of rocks.

"These three species, described under the name of *Succineæ,* belong to that group of *Heliceæ* of which the well-known *Hel. gallinasultana,* Chemn., is the type. The shell having no columella is perfectly analogous to that of the genuine *Succineæ,* and we are informed by Mr. D'Orbigny's observations, that the animal of *H. gallinasultana* is also very similar to *Succinea* in its form and habits. Accordingly this species must be related to *Succinea,* and I believe that the species above described should not be separated from it, although we do possess but imperfect notions of their habits. Of one species it is noticed that it was found on a species of *Juncus,* probably in the vicinity of water.

"By the same reason (the analogy of shells) I have enumerated the *Bulimus Broderipii* and *Coquimbensis* among the *Succineæ* (in my 'Symbolæ ad Historiam Heliceorum')."

GEOLOGICAL SOCIETY.

[The following interesting extracts are taken from the Anniversary Address delivered by the President, R. I. Murchison, Esq., on the 17th of February 1843.—Ed.]

Palæontology.

Ichthyology.—Geologists who have commenced their career since the glacial theory has been in vogue and have read the numerous memoirs and heard the exciting discussions to which it has given rise, are chiefly acquainted with Professor Agassiz as one of its most ingenious expounders. I have now the pleasure to acquaint you that M. Agassiz is once more completely absorbed in his great work on fossil fishes—that work which you so justly honoured, in the year 1835 to 1836, with your Wollaston Donation and Medal. Of his progress in this arduous undertaking, he has recently given

substantial proofs, in the description of many ichthyolites of the Old Red Sandstone of Scotland; and, in addition to this, he will shortly publish a series of fossil fishes, exclusively illustrative of the tertiary basins of London and Paris, from which an enormous number of species has been collected.

In reference to the geological researches of my friends and myself in Russia, I must here state, that as it is our one great object to place in correct parallel the Palæozoic types of Russia with those of the other parts of Europe, we could not hesitate in referring all our Russian ichthyolites to Professor Agassiz; for whilst it must be acknowledged that Russia contains naturalists of great merit, and that among them M. Pander and Professor Asmus had commenced inquiries into the nature of these fossils, it was obvious that, skilful as they undoubtedly are, they could not, for want of comparisons, afford us the knowledge of which we stood in need. Professor Agassiz, who has at his disposal fossil fishes from all those parts of Europe, the geological structure of which has been well explained, was alone capable of answering the following query; To what extent do the ichthyolites of Russia, which lie in beds superior to the Silurian rocks, and which are surmounted by the Carboniferous limestone, resemble those with which we are so well acquainted in Scotland and England? His reply has indeed been most satisfactory.

So complete, says he, is the identity of about ten species of the Scottish and Russian strata, that the specimens from the two countries may be confounded. Among them the *Holoptychius nobilissimus*, three species of the *Dendrodus* (Owen), *Diplopterus macrocephalus*, are forms which might strike any good observer, as they have been previously published by M. Agassiz; but from the more perfect specimens of other species which we brought from Russia, he has been enabled to recognize the presence in Scotland of the species of a common Russian genus, the *Glyptosteus*, and also of that gigantic genus the *Chelonichthys*, to whose remains I have before directed your attention as having been recognized to be of ichthyic character by Professor Asmus. To this enormous fossil fish, some of whose thoracic bones are as large as the breast-plate of a well-grown warrior, and a single bone of which measured nearly three feet in length, Professor Agassiz has given the name of *Chelonichthys Asmusii*; and he now informs me that he possesses fragments of the same creature from the north of Scotland. The knowledge of this fact will doubtless lead to redoubled activity on the part of Mr. Hugh Miller and those Scottish naturalists who inhabit the shores of the Cromarty and Murray friths, to produce a rival of the Russian giant; a hope which I cannot express without deeply lamenting the death of a most successful explorer of these remains, whose loss geologists have to deplore, in common with every one who could appreciate her range of thought, her accomplishments, and her goodness*.

The results, however, of the examination of the Russian ichthy-

* Lady Gordon Cumming.

olites go still further; for, on submitting to the microscope of Professor Owen some teeth similar in outline to those of his genus *Dendrodus*, he discovered in them precisely the same dendridic disposition of the vascular canals as that which led him to establish the genus from Scottish fossils. Nor does the value of this application of the microscope stop here, for Professor Agassiz has informed me, that availing himself of the weapons which Professor Owen had so skilfully wielded, he has commenced a series of researches, not only into the teeth but also into the structure of all the hard enamelled bones of the Russian fossil fishes, by which he will be able to show the same distinction in the other bones of the genera of this class, which Professor Owen has successfully established in relation to the hard parts of the higher order of animals. In such hands, therefore, the microscope has become an instrument of great utility in identifying fragments apparently obscure; and, as it has been applied to the shells of Mollusca, and even to the lowest links in animal life, as well as to fossil plants, the geologist has thus acquired a new and powerful auxiliary. I am here, however, treading on ground now fortunately occupied by the Microscopical Society, the active promoters of which are well entitled to our gratitude.

Mylodon.—One of the most brilliant, and, I venture to say, not the least durable of the researches in palæontology, remains to be mentioned in the description of the *Mylodon robustus*, a new species of gigantic edentate animal, accompanied by observations on the affinities and habits of all Megatherioid animals. After a sketch of the labours of Cuvier, who first described the huge Megatherium and pointed out its analogy to the family of Sloths and Armadillos, of the succeeding writings of Jefferson and Harlan upon the genus Megalonyx, of Dr. Lund on the Cœlodon and Sphenodon of Brazil, and of his own researches which established the Mylodon and Scelidotherium, Professor Owen proceeds to describe the megatherioid animal which he has named *Mylodon robustus*.

Of the purely anatomical descriptions, it is not my province to speak, and referring you to the work in which, through the enlightened munificence of the College of Surgeons, all the necessary illustrations have appeared, I pass to the generalizations, and learn that the Mylodon, in common with the Megatherium and Megalonyx, are genera of the family of *Gravigrada*, as distinguished from the *Tardigrada* in the order *Bruta*.

Professor Owen then proceeds to a comparison of the anatomy of the Mylodon with that of all analogous creatures, and after an able analysis, he satisfies himself, and also, I am persuaded, every one who has followed his close reasoning, that he has at length ascertained the true habits and food of this family of mammifers. From their dentition, it is inferred that the Megatherium and Mylodon must have been phyllophagous, or leaf-eating animals; whilst, from their short necks, the very opposite extreme to the camelopard, they never could have reached the tops of even the lowest trees. Cuvier, on the contrary, suggested that they were fossorial, or dig-

ging animals; and we all recollect the animated manner in which Dr. Buckland attracted us, whilst he described the Megatherium as a huge beast, which, resting upon three legs, employed one of its long fore-hands in grubbing up whole fields of esculent roots; a habit which procured for it the significant popular name of "Old Scratch."

Dr. Lund, a Danish naturalist, had considered the Megatherium to be a scansorial or climbing animal; in short, a gigantic Sloth. After a multitude of comparisons, Professor Owen rejects the explanation of all his predecessors. He shows that the monstrous dimensions of the pelvis and sacrum, and the colossal and heavy hinder legs, could never have been designed, either to support an animal which simply scratched the earth for food, or one which fed by climbing into lofty trees, like the diminutive Sloth; and he further cites the structure of every analogous creature, either of burrowing or climbing habits, to prove, that in all such the hinder legs are comparatively light. What then was the method by which these extraordinary monsters obtained their great supplies of food? The osteology of the fore-arm has, it appears, afforded answers which are valuable, chiefly for their negation of erroneous conjectures, such as that the animal was an ant-eater, rather than for the habits which it directly elicits. It is, therefore, to the organization of the hinder limbs that Professor Owen mainly appeals to ascertain the functions of the fore-feet and the general habits of the Mylodon.

Arguing that the enormous pelvis must have been the centre whence muscular masses of unwonted force diverged to act upon the trunk, tail and hind-legs, the latter, it is supposed, formed with the tail a tripod on which the animal sat. Professor Owen supposes that the animal first cleared away the earth from the roots with its digging instruments, and that then seated on its hinder extremities, which with the tail are conjectured to have formed a tripod, and aided by the extraordinary long heel as with a lever, it grasped the trunk of the tree with its fore-legs. Heaving to and fro the stateliest trees of primæval forests, and wrenching them from their hold, he at length prostrated them by his side, and then regaled himself for several days on their choicest leaves and branches, which till then had been far beyond reach. After showing that from the natural inversion of the hind-feet the Mylodon approached to the scansorial animals, and thence inferring that it might have had climbing powers necessarily much limited by the other parts of its frame, Professor Owen states, that the inversion of the soles of the feet is least conspicuous in the Megatherium, whose bulk and strength would be adequate to the prostration of trees too large for the efforts of the Mylodon, Megalonyx and Scelidotherium. The Megatherium, in short, was the mighty tree-drawer, and had therefore no need of the adventitious aid of any climbing apparatus. Allow me to add, that, amongst other reasonings, those which lead to conclusions that one class of megatherioid animals was furnished with a hairy coating (like the Mylodon), whilst another, like the great Megatherium, was devoid of it, as evi-

denced by slight modifications of the bony structure of the hind-feet, appear to me to be not the least original and interesting.

Wholly incapable, as I am, to do justice to this masterly inquiry by the necessarily brief allusion which is imposed upon me by the nature of this discourse, I shall best execute my task in quoting the words with which Professor Owen sums up his reasoning.

"On the Newtonian rule, therefore, this theory has the best claim to acceptance; it is, moreover, strictly in accordance with, as it has been suggested by, the ascertained anatomy of the very remarkable extinct animals, whose business in a former world it professes to explain. And the results of the foregoing examination, comparisons and reasonings on the fossils proposed to be described, may be summed up as follows. All the characteristics which exist in the skeleton of the Mylodon and Megatherium, conduce and concur to the production of the forces requisite for uprooting and prostrating trees; of which characteristics, if *any one were wanting, the effect could not be produced*: this, therefore, and no other mode of obtaining food, is the condition of the sum of such characteristics, and of the concourse of so great forces in one and the same animal."

This, Gentlemen, is the true Cuvierian style, in which, as in numberless parts of his works, Professor Owen has continued to breathe out the very spirit of the founder of palæontological science.

It is by such labours that geology is steadily gaining a higher place among the sciences. Comparative anatomy has truly been our steadiest auxiliary, and well may we do honour to those who impart to us such truthful records; for, whilst the histories of the earlier beings of our own race are shrouded in obscurity, whilst the first chronicles of ancient Rome and Greece are now admitted to be exaggerated, and often even fabulous, we turn back the leaves of far more antique lore; and, not trusting to perishing inscriptions, mutilated by successive conquerors, and assuming a hundred meanings under the eyes of doubting antiquaries, we appeal only to the proofs in nature's book, and find that their reading is pregnant with evidences which must be true, because they are founded on unerring general laws.

In concluding this Address, I can assure you, Gentlemen, that, although not prepared without some labour, its composition has afforded me both gratification and instruction. Had I not felt a strong obligation to fulfil my duty, I should necessarily have been absorbed in the preparation of the work upon Russia to which I have alluded, and could not therefore have been imbued with an adequate sense of the vast progress which our science has recently made in all quarters of the globe.

BOTANICAL SOCIETY OF LONDON.

Sept. 1, 1843.—J. E. Gray, Esq., F.R.S. &c., President, in the Chair.

Dr. Wood of Cork presented a specimen of *Neottia gemmipara*, found in Ireland.

Dr. Thomas Taylor presented the following species of *Junger-*

manniæ new to the British Flora: *Jungermannia reclusa* (MSS. Taylor), *J. fragilifolia* (MSS. Taylor), *J. germana* (MSS. Taylor), and *J. riparia* (MSS. Taylor).

Read "Observations on some varieties of *Hypna* and on a new species of Lichen," by Dr. Thomas Taylor.

Local collections of Cryptogamic plants are instructive in two ways; by contributing to our knowledge of the geographical distribution of the species, and by pointing out the directions which the characters of the varieties take when acted on by diversity of circumstances of external agencies. The Cryptogamic collection of Dr. G. Watson from the vicinity of Philadelphia, presented to the Botanical Society of London, elucidates in some particulars the foregoing remark; not however to a great extent, as the collector seems to have satisfied himself with gathering the largest and most prominent species, and to have omitted or overlooked the minuter and more inconspicuous kinds: yet what has been collected is far from being destitute of interest and value.

Thus he has remitted to London a great profusion of *Neckera cladorrhizans* (Hedw.). Now this moss was first described from Swiss specimens by Hedwig; it was afterwards sent to this country from Nepal by Dr. Wallich, and from New York by Dr. Torrey; finally we have it in the present collection from Philadelphia.

In Great Britain and Ireland, so fertile in mosses, it is totally unknown. We may therefore conclude that this species is altogether continental, although for the present we are unacquainted with those laws that deny to it an insular locality.

We have *Hypnum salebrosum* (Hoffm.), by its smaller size, imposing upon us the form of a new species; but although the branches are more compressed and shorter, the leaves somewhat narrower, the pedicels more slender, and the capsules soon turning black, yet in all essential characters it entirely agrees with our British species.

Hypnum plumosum (L.) with us assumes diversified forms, among which a remarkable one, collected by the late Miss Hutchins at Glengeriff, has all the leaves decidedly secund.

The variety gathered by Dr. Watson has the upper leaves alone heteromallous; but then its more erect and longer capsules, and the less concave but substriated leaves, claim the adjustment of the balance between species and variety by a practised hand.

Dr. Taylor considered it less hazardous for the present to leave it in the rank of the latter. But the impatient may say, when then are we to expect the means of exactly deciding? The answer is, perhaps, not until some muscologist enjoys the privilege of seeing both growing in their native localities; for there is much value in the character taken from the habit of a plant. Many modern elevations of varieties to the rank of species have been first suggested by the silent appeal of the look of the growing individuals.

In Dr. Watson's state of *Hypnum rutabulum* (L.), a mark hitherto considered essential to the species seems to be vanishing. The pedicels exhibit scarcely any appearance of roughness immediately below the capsules; in all other particulars the Philadelphian and

European mosses coincide. But Mr. Wilson, whose observations on this tribe are always as original as acute, has long since taught Dr. Taylor that the scabrous state of the pedicel in this species is liable to great variation; insomuch that he seems disposed to doubt if *Hypnum vagans* of Hooker in Drummond's 'Musci Americani,' separated principally on account of the smoothness of its fruit-stalks, be really distinct from *Hypnum rutabulum* (L.).

Among the very few lichens sent by Dr. Watson is a species of *Cenomyce* which may be considered new, and called *Cenomyce foliacea.* Its specific character may be thus given :—

"Podetia two inches high, loosely cæspitose, dichotomously branched, the ultimate branches subulate and tipped with brown; the buds in flattened, granular, pale green elevations of the cuticle, soon expanding into flat lobes which are subpinnately branched and crenate, pale glaucous above, snow-white beneath, unaltered by moisture. There were no apothecia present."

The generic name is that of Acharius, which perhaps should not be abandoned but upon the clearest necessity. The modern subdivision of this genus into *Cladonia* and *Scyphophorus* appears attended with no advantage, while the species of these two tribes are, by the confession of the adopters themselves, joined by links that appear inseparable from either set. Indeed on this question the present plant is quite in point, having all the habit of *Cenomyce sparassa* (Ach.), (*Scyphophorus* of Fée and of DeCandolle), with the attenuated and subulate branches of *Cladonia* (of the same authors).

The buds of lichens have not received the consideration from botanists which their importance merits.

Hitherto the characters have been drawn from the *thallus* or from the *apothecia* alone; but the buds by which, for the most part, these plants are multiplied, and which, if watched during development, present most remarkable features, should be hailed as a new and welcome element for specific distinctions.

In *Cenomyce sparassa* (Ach.) the buds originate in coarse white granules, thickly set and rising at once above the surface of the *podetia*; in our plant they are flat, scarcely eminent above the cuticle of the *podetia*, pale glaucous green from the beginning, and not so densely crowded, nor do they expand into lobes so linear. Another character may be taken from the branches of the *podetia*, which in the former are nearly parallel and of equal thickness except at the very summit, while in *Cenomyce foliacea* they are more gradually acuminated and divaricated above.

MISCELLANEOUS.

GRIFFITHSIA SIMPLICIFILUM, AGARDH.

This species of Alga, which has not been noticed as occurring on any part of the coast of Great Britain, was found plentifully by Mr. R. Ball and myself at Freshwater bay, in the Isle of Wight, on the 7th of August 1841. The species has a place in the British cata-

logue from specimens obtained by Mr. Harvey in the county of Wicklow, in Ireland, and there only. It is a native of the coast of France. —Wm. Thompson (Belfast).

ITALIAN FIRE-FLY IN NORFOLK.

To the Editors of the Annals of Natural History.

Swaffham, Norfolk, Sept. 7, 1843.

Gentlemen,—I wish, through the medium of your valuable publication, to make known a circumstance which, as far as I can learn, has been hitherto unnoticed in England. On going into my green-house between seven and eight o'clock in the evening of the 22nd of August, I was surprised at perceiving a glimmering light amongst the vines, which, on further observation, I discovered to proceed from a "lucciola," or Italian Fire-fly, with whose habits and appearance a long residence in Italy has rendered me familiar. Although the windows of the green-house were always open till within an hour of sunset, so that every facility was offered for its escape, the little stranger regularly became visible after dark for ten or twelve evenings in succession, and was seen by many of the inhabitants of Swaffham, whose curiosity attracted them to the spot. I can only account for this circumstance by having lately received from Italy five or six orange-trees, the roots of which, being encased in balls of mould, might have afforded a shelter to the insect in its chrysalis state, subsequently developed into active existence by the heat of the green-house. May I beg to be informed through the pages of the 'Annals,' if the appearance of this insect in England be hitherto unrecorded? and any light which can be thrown on the subject will greatly oblige, Gentlemen, your obedient servant,

John Dugmore, Jun.

OCCURRENCE OF RARE BRITISH BIRDS.

Phil. Hall, Leeds, Sept. 13, 1843.

The last week in July a specimen of the *Sterna anglica* (Gull-billed Tern) was brought alive to me which had been shot on the reservoir of a mill on the York Road, Leeds, a mature bird.

In May last a fine male Roller flew on board the Hamburgh steamer when about forty miles beyond Flamboro' Head, and was shot and brought to Leeds by my friend Mr. Thomas Stansfeld of this town. —Henry Denny.

CAPTURE OF A WOLF-FISH.

To the Editors of the Annals of Natural History.

Rooms of the Devon and Cornwall Natural History Society,
Plymouth, August 10, 1843.

Gentlemen,—I beg to inform you that a specimen of the Wolf-fish (*Anarrhicas lupus*) was captured off this port a few days since, and forwarded to me for presentation to this Society. The specimen in question is about three feet long; the stripes represented in "Yarrell" not very conspicuous, and the mark on the head less so; the teeth very large; the flesh very similar in appearance to veal,

the skin very tough; no ova or milt discoverable; the stomach contained small crabs, *Pecten opercularis, Fusus corneus,* &c., all fractured by the conical and flat sets of teeth prior to being swallowed; the containing viscus itself large and membranous; the intestines short, but of large calibre. The fishermen who took it called it a "Cat-fish," evidently showing a previous acquaintance with it. This is however the first record of its capture on this coast, and Mr. Couch does not enumerate it as a Cornish species.

Can one of your correspondents tell me whether the male of *Lamna Cornubica* has a large stiff spine in the ventral fins, thereby distinguishing it from the other sex?

I am, Gentlemen, your obedient servant,
J. C. Bellamy, *Curator.*

Description of a "Blind Fish" from a Cave in Kentucky. By Jeffries Wyman, M.D.

The specimen from which the following description is drawn was presented to the Boston Society of Natural History by J. G. Anthony, Esq. of Cincinnati. It corresponds for the most part with the description of the *Amblyopsis spelæus,* described by Dr. Dekay in the 'Fauna of New York,' but in some particulars it differs.

The specimen here described was $4\frac{1}{10}$ inches long, and characterized by a broad vertically compressed head, covered with a whitish integument entirely destitute of scales; but on it are seen numerous elevations or ridges, most abundant on the lateral portions, some of them intersecting each other at right angles. The lower jaw is more prominent than the upper; no appearance of eyes; nostrils double, the anterior ones tubular, the posterior nearly circular, about $\frac{1}{10}$th of an inch behind the preceding. Both jaws are provided with folds of skin or lips; intermaxillaries and lower jaw armed with minute slender and slightly recurved teeth, most abundant at a short distance from the median line—a group of teeth on palatines on each side; also two groups in pharynx above and four below. Upper maxillaries concealed by integuments and destitute of teeth. Intermaxillaries form the borders of mouth above, and extend nearly to its angles. Branchial aperture large, branchiostegous rays six on each side.

Body covered with circular scales which terminate abruptly at the posterior limit of the head; the scales are smaller on back than on the sides, and are so enveloped in the cuticle as not to present free edges. Lateral line occupies the middle of the lateral region; commencing under the anterior extremity of the dorsal fin, passes directly backwards. First ray of dorsal a little posterior to the middle of body; anal commences a little behind the dorsal; abdominals very small.

Fin rays:—Pectoral, 10; dorsal, 10, first very minute; caudal, 17 or 18; anal, 9; abdominal, 4.

Anus very far forwards, about $\frac{2}{10}$ths of an inch behind the angle formed by the union of branchial membranes.

Alimentary canal; entire length less than that of the body. Œsophagus very short; stomach cylindrical, terminating posteriorly in a

short triangular cul-de-sac, the point of which reaches the posterior limit of the cavity of the abdomen. Stomach contracted, and mucous membrane thrown into longitudinal folds. Pylorus situated near posterior extremity of stomach ; has a distinct valve which projects into cavity of duodenum ; two short pyriform cæcal appendages open by distinct orifices on opposite sides of intestine. Mucous membrane of small intestine arranged in reticulated cells, which become less distinct towards termination. Length of small intestine $1\frac{1}{2}$ inch; of large intestine $\frac{1}{2}$ inch; the two separated by a distinct valve.

Liver consists of two lobes; left extending nearly whole length of abdominal cavity, right very short. Gall-bladder distinct.

Air-bladder cordiform, deeply cleft anteriorly.

Brain; from anterior extremity of olfactory lobes to posterior portion of cerebellum, $0{\cdot}2\frac{1}{4}$ inch. Olfactory lobes in contact with and just in front of cerebral hemisphere, of slightly pyriform shape, and giving off large olfactory nerves. Cerebral lobes nearly spherical, slightly compressed on median line, where the left and right unite. Optic lobes much smaller than preceding, and partly concealed by the cerebellum. Cerebellum nearly spherical, slightly divided on median line, giving it a somewhat cordiform appearance. Fourth ventricle completely exposed and widely open. Posterior pyramidal bodies distinct, projecting over the cavity of the ventricle near its middle. External to these last arise the branchio-gastric nerves. Auditory sacs large ; ampullæ of semicircular canals containing otolites, one of which is of a trapezoidal shape, and nearly equalling in size one of the cerebral hemispheres. The inferior optic lobes, "lobi inferiores," very small, not larger than a pin's head ; in front of them rests the pituitary body. No optic nerve was found. Branchio-gastric and fifth pairs of nerves of the usual size.

Internally the nostrils consist of an ovoidal cavity $\frac{1}{10}$th of an inch in longest diameter; olfactory membrane arranged in seven folds or digitations of unequal length, and radiating from a point in the anterior portion of the cavity. At the anterior extremity of this cavity is a small orifice opening into a blind sac or canal, which passes at first directly backwards and then ascends upon the upper surface of the cranium. On the most careful dissection no traces of eyes were found.

From the above description it appears that this fish, inhabiting a dark cavern, is reduced, as regards its organs of vision, to a much more imperfect condition than the *Proteus anguinus*, inhabiting the subterranean caverns of Illyria, or the common mole, in both of which eyes exist, although of a microscopic size. Dr. Dekay has placed this fish among the *Siluridæ*; though, as he distinctly states, only provisionally. The presence of scales and cæcal appendages to the pylorus, as well as the absence of cirrhi about the mouth, would seem to indicate feeble affinities with the *Siluridæ*. The parts entering into the composition of the brain, when compared with those of the *Pimelodus*, present many differences in the size and proportions. Its true affinities cannot be well determined until an opportunity shall be afforded by future dissections for the examination of its osteology.—*From Silliman's American Journal*, July 1843.

On Fermentation. *By* Prof. E. Mitscherlich.

Fermentation is effected by a vegetable, putrefaction by an animal production. In the course of the two last winters the author observed in a large number of putrefying substances only one species of Infusorium to be developed, which consisted of one or of several globules, in the latter case arranged in series; the diameter of such globules was about 0·001^{mm}, the motion vibratory. According to his observations it would seem probable that the other animalcules, which are observed in putrefying substances, have been conveyed into them by means of the atmosphere, insects, or some other means. A certain quantity of oxygen is requisite for the development and existence of these Vibriones, and the putrefactive process is dependent, according to the author, on the free access of a certain amount of atmosphere to the decaying substances. The maceration of vegetable substances in water, even when the temperature in the rooms is kept at a summer heat, appears to depend solely on these Vibriones, when the substances are employed in a clean state. During this process nitrogen is disengaged. These Vibriones are widely diffused in the intestinal canal throughout its entire course, in the cavity of the mouth, and in the stomach, of which it is very easy to be convinced by examining under the microscope the matter which collects or remains on the teeth; sometimes they are even found on the skin, but the author has hitherto not succeeded in detecting them in the blood, in the milk, in urine, in the gall, or in other fluids of this kind.

When a little sugar is added to the liquid in which these animals are formed, their number augments considerably, and at the same time a vegetable production is generated, viz. ferment. If a larger amount of sugar be added, the production of these animals is suspended or ceases entirely, and a greater quantity of ferment is formed. The author has never observed ferment to be formed in a liquid which contained no sugar. Whether a fungus be the fermentative fungus or another species, may be determined with certainty under the microscope; but also very easily by adding some of it to a solution of sugar, and observing whether any fermentation ensues. In a clear liquid, in which it is possible for ferment to be produced, a turbidness is first perceived, and under the microscope globules of various sizes, from the smallest dimensions hitherto observed up to a diameter of 0·01^{mm}. From day to day the small globules increase in size, and many new ones become apparent. In some liquids, as for instance in the juice of the grape, only a few individual globules are observed, which are generally of an oval form; and sometimes, but rarely, a second is developed at one of the extremities, but this never attains to the size of the primitive globule. Ferment which has been produced for some time by means of other ferment is otherwise circumstanced; from having been multiplied through a series of years it has acquired a constant character. In the breweries two kinds of ferment may be distinguished with certainty, the bottom ferment and the top ferment. The former multiplies at a tempera-

ture which must not exceed 48°, nor go below 32° Fahr.; this is the ferment in Bavarian beer. The most beautifully developed top ferment is that of Berlin white beer, which multiplies at a temperature of about 77°. Bottom ferment consists of single globules of various sizes. The author never observed a small globule to be formed on any part of a large one; the smaller globules are always diffused throughout the liquid. In top ferment scarcely ever could any single small globules be detected, but only large ones, at the extremities of which the smaller globules were developed, thus forming ramifications. These increase therefore by the production of gems; the bottom ferment, on the contrary, by small globules growing isolated in the liquid. The author exhibited drawings of the two species of ferment in the various periods of their development. In the older ferment an envelope and granular contents may be readily distinguished, which becomes however more evident on the addition of a drop of aqueous solution of iodine. By means of a compressorium invented by the author, the granular contents may be easily pressed out under the microscope. The author considers it probable that in the bottom ferment the globules burst and disburthen themselves of their contents, from each granule of which a new globule is developed, so that the bottom ferment would be multiplied by sporules.

Substances which act as poisons on fungi destroy the action of ferment, for instance corrosive sublimate, and other substances of similar nature; but liquids which act most violently on the animal frame, such as tartar-emetic, in solutions of which fungi very readily develop, do not disturb the process of fermentation.

Several fungi which are known as vegetable diseases are similarly circumstanced, as for instance dry rot to woody fibre; and with these facts a new field is evidently opened, explanatory of the decompositions which the roots of plants are capable of effecting in the soil; and it may be expected that we shall be able to demonstrate by experiment, what general experience has shown, that the roots of plants, when unable to obtain from the atmosphere the substances requisite for their development, take them from the soil; and it is not improbable that the roots themselves effect the necessary decomposition of the substances contained in the soil, just as the greater portion of vegetables obtain the requisite substances for their first development from the seed itself. Although this is difficult to prove in the higher order of plants, it may be proved more definitely in the lower tribes, especially in the fungi, as for instance in the champignon. The process of fermentation is therefore of considerable interest. One of the most important chemical combinations is decomposed by a contact-substance, which contact-substance is an organized being belonging to the most simple forms, the development of which may be traced in the most easy and certain manner; but its first origin is moreover of great interest, for it is formed in a liquid in which it appears as numerous points so small as to escape observation.—Poggendorff's *Annalen*, No. 5 for 1843.

LETTERS FROM RAY TO SIR HANS SLOANE.

[MS. Sloan. Brit. Mus. 4056. fol. 225. *Orig.*]

Black Notley, April 13, 1700.

SIR,—Upon Reading your Letter of the 6th instant I could not but be moved with indignation against those vile Rogues who, when they failed in their attempt of breaking open your House, were so malicious as to set it on fire. I congratulate with you your deliverance from so great a danger, and humbly thank God on your behalf.

The scurrilous Pamphlet entitled the Transactioneer* I did always believe to be no better than you represent it.

And for Dr. Plukenet, I look upon him as an ill-natured man, and liable to mistakes, how ever confidant and self-conceited he may be, that I say nothing of his unskilfulnesse and want of exactnesse in the Latine and Greek tongues. His arrogance and overweening opinion of himself and his performances appears by that hemistichium prefixt to his Phytography, *Nil nisi præmia desunt.* I doe not urge the sending me your Magellane-straits Plants. I am in no hast for them, but can well wait your leisure.

I did not expect so great and rich an addition to my Supplement of History as you tell me Dr. Sherard intends generously to contribute: in which respect it is well my Undertakers were so dilatory in beginning upon it. It will be greatly for the advantage of the Work if ever it comes to be published†. I should be very glad to see Dr. Sherard, and to have some conference with him, though loath I am he should put himself to the trouble and expense of such a journey for my sake. Please to give my service to him, and tell him so much.

* * * * * *

Dr. Tournefort's Institutions may be of use to me as to the Methodus Plantarum emendata, which I have ready for the Presse, both for the correcting of some mistakes which possibly I may have committed, and the enlarging of it by new Observations.

I have done when I have told you that I am,

Sir, your very much obliged friend and humble servant,

JOHN RAY.

To his honoured friend Dr. Hans Sloane, &c.

His farewell before his death.

[Ibid. fol. 284. *Orig.*]

DEAR SIR,—The best of friends, these are to take a final leave of you as to this world. I look upon myself as a dying man. God requite your kindnesse expressed any ways towards me an hundred fold, blesse you with a confluence of all good things in this world, and eternall life and hapinesse here after. Grant us an happy meeting in heaven. Sir, eternally yours,

B. Not. Jan. 7, 1704. JOHN RAY.

When you happen to write to my singular ffrend Dr. Hotton, I

* 'The Transactioneer, with some of his Philosophical Fancies; in two Dialogues.' 8vo, Lond. 1700.

† The third volume, or 'Supplement of the Historia Plantarum,' was published shortly before Ray's death. Fol. Lond. 1704.

pray tell him I receivd his most obliging and affectionate Letter, for which I retourn thanks, and acquaint that I was not able to answer it . . . . .

For Dr. Hans Sloane, at his house in Southampton Square, London.

Almost ready for Publication.

Crustacealogical Researches, Part I. By Harry D. S. Goodsir, Conservator of the Museum of the Royal College of Surgeons in Edinburgh.

This is the commencement of a series of memoirs for the illustration of the Comparative Anatomy and Natural History of the Crustacea.

METEOROLOGICAL OBSERVATIONS FOR AUGUST 1843.

Chiswick.—August 1. Very fine. 2. Cloudy and fine. 3. Cloudy: thunder-storm, with very heavy rain, the latter continuing throughout the night. 4. Rain: showery: clear. 5—8. Very fine. 9. Sultry: lightning at night. 10. Hazy: clear and fine. 11—14. Exceedingly fine. 15. Sultry: thunder-storm at night. 16. Thunder, lightning and heavy rain: clear and fine at night. 17. Foggy: sultry. 18. Foggy: hot and sultry: clear and fine. 19. Cloudless and very fine. 20. Overcast and fine. 21. Clear: cloudy and fine: clear. 22. Overcast: rain. 23. Fine: overcast: heavy rain at night. 24. Cloudy: clear and fine. 25. Very fine: cloudy: lightning. 26, 27. Very fine. 28. Rain: overcast and windy. 29. Cloudy. 30. Light haze and fine. 31. Hazy: very fine: clear.—Mean temperature of the month 1°·1 above the average.

Boston.—Aug. 1. Cloudy. 2. Fine. 3. Fine: rain A.M. and P.M. 4. Cloudy: rain A.M. and P.M. 5. Fine. 6. Fine: rain early A.M. 7. Cloudy. 8. Fine: thermometer 77° 2 o'clock P.M. 9. Cloudy: rain, thunder and lightning from 11 A.M. to 11 P.M. 10. Cloudy. 11—13. Fine. 14. Fine: rain, thunder and lightning at night. 15. Rain: heavy thunder-storm A.M. 16. Cloudy: heavy rain P.M. 17. Cloudy. 18. Foggy. 19. Fine. 20. Cloudy: rain P.M. with thunder and lightning. 21. Fine. 22. Cloudy: rain P.M. 23. Fine. 24. Rain: rain early A.M. 25—28. Fine. 29. Cloudy: rain early A.M.: rain A.M. 30, 31. Cloudy.—N.B. This month shows the largest fall of rain in one month since July 1839.

Sandwick Manse, Orkney.—Aug. 1. Cloudy: rain. 2. Cloudy: drops. 3. Fog: cloudy. 4. Cloudy. 5. Bright: rain. 6. Bright: cloudy. 7. Cloudy: showers. 8, 9. Bright: clear. 10. Clear. 11, 12. Cloudy: clear. 13. Clear: cloudy. 14. Bright: cloudy. 15. Clear. 16. Clear: fog. 17. Cloudy: showers. 18. Damp: fog. 19. Bright: thunder. 20. Bright: cloudy. 21. Bright: drops. 22. Cloudy: clear. 23, 24. Clear. 25. Bright: showers. 26. Clear: thunder. 27. Thunder. 28. Showers: rain. 29. Showers: cloudy. 30. Drops: cloudy. 31. Cloudy.

Applegarth Manse, Dumfries-shire.—Aug. 1. Wet all day. 2. Very wet. 3. Fair and fine. 4. Fine: one shower. 5. Fine. 6. Showers and sunshine. 7. Wet all day. 8. Wet. 9. Very clear and fine. 10. Very fine: one shower. 11. Very fine, but fair. 12, 13. Very fine. 14. Fine, but heavy rain P.M. 15. Fine, but fair. 16. Fine: fair: thunder P.M. 17, 18. Fine. 19. Fine: thunder. 20. Heavy showers A.M. 21. Fair A.M.: rain P.M. 22. Heavy rain. 23. Rain: cleared P.M. 24. Very fine. 25, 26. Rain. 27. Shower. 28. Heavy showers. 29—31. Fair and fine.

Temperature (mean) of spring-water	53°·5
Ditto August 1842	50 ·7

Meteorological Observations made at the Apartments of the Royal Society, LONDON, *by the Assistant Secretary,* Mr. Roberton; *by* Mr. Thompson *at the Garden of the Horticultural Society at* CHISWICK, *near London; by* Mr. Veall, *at* BOSTON; *by the* Rev. W. Dunbar, *at Applegarth Manse,* DUMFRIES-SHIRE; *and by the* Rev. C. Clouston, *at Sandwick Manse,* ORKNEY.

Days of Month. 1843. Aug.	Barometer. London: Roy. Soc. 9 a.m.	Chiswick. Max.	Chiswick. Min.	Boston. 8½ a.m.	Dumfries-shire. 9 a.m.	Dumfries-shire. 9 p.m.	Orkney, Sandwick. 9½ a.m.	Orkney, Sandwick. 8½ p.m.
1.	30·022	29·934	29·849	29·38	29·68	29·65	29·62	29·61
☽ 2.	29·792	29·750	29·621	29·21	29·42	29·30	29·47	29·38
3.	29·638	29·574	29·551	29·04	29·25	29·28	29·34	29·37
4.	29·586	29·605	29·527	28·96	29·30	29·45	29·40	29·50
5.	29·848	29·858	29·774	29·22	29·60	29·58	29·54	29·57
6.	29·960	30·116	29·890	29·33	29·65	29·94	29·75	29·88
7.	30·286	30·211	30·191	29·64	29·98	29·95	30·02	29·90
8.	30·302	30·220	30·153	29·61	30·00	29·98	30·05	29·99
9.	30·136	30·060	29·950	29·46	30·01	30·00	30·00	30·13
○ 10.	30·080	30·177	29·997	29·50	30·12	30·09	30·19	30·20
11.	30·320	30·237	30·234	29·70	30·16	30·73	30·15	30·16
12.	30·322	30·237	30·213	29·70	30·18	30·18	30·13	30·28
13.	30·290	30·211	30·093	29·70	30·02	30·08	30·28	30·20
14.	30·100	30·074	29·945	29·54	29·93	29·96	30·15	30·15
15.	29·978	29·923	29·894	29·36	29·98	29·92	30·15	30·14
16.	30·052	30·040	29·979	29·43	30·04	29·99	30·15	30·09
17.	30·180	30·100	30·088	29·54	30·06	30·05	30·00	30·10
☾ 18.	30·152	30·084	29·958	29·50	29·85	29·97	30·06	30·00
19.	29·898	29·820	29·670	29·29	29·62	29·69	29·81	29·70
20.	29·726	30·171	29·647	29·00	29·83	29·79	29·62	29·68
21.	30·072	29·977	29·855	29·45	29·23	29·59	29·71	29·50
22.	29·702	29·640	29·477	29·10	29·38	29·27	29·21	29·18
23.	29·688	29·619	29·412	29·00	29·62	29·50	29·20	29·42
24.	29·682	29·787	29·599	29·08	29·65	29·70	29·65	29·50
● 25.	29·910	29·889	29·835	29·26	29·74	29·68	29·65	29·65
26.	29·986	30·068	29·929	29·34	29·95	29·82	29·72	29·73
27.	30·208	30·139	30·080	29·59	29·75	29·91	29·89	29·85
28.	30·058	29·994	29·916	29·44	29·81	29·50	29·72	29·50
29.	30·040	30·037	29·964	29·32	30·05	29·98	29·68	29·85
30.	30·180	30·138	30·092	29·59	30·09	30·07	29·93	30·05
31.	30·286	30·195	30·158	29·66	30·00	30·10	30·05	30·00
Mean.	30·015	29·996	29·891	29·38	29·804	29·826	29·815	29·814

Days of Month. 1843. Aug.	Thermometer. London: R.S. Fahr. 9 a.m.	London: R.S. Self-reg. Mx.	London: R.S. Self-reg. Min.	Chiswick. Max.	Chiswick. Min.	Boston. 8½ a.m.	Dumf.-shire. Max.	Dumf.-shire. Min.	Orkney, Sandwick. 9½ a.m.	Orkney, Sandwick. 8½ p.m.
1.	62·3	76·0	53·6	72	46	61	59	50	58	54
☽ 2.	63·7	74·2	54·6	62	52	61	58½	53½	59½	55
3.	64·0	66·7	56·5	62	54	64	64	54	59	55
4.	60·4	67·4	57·6	68	46	62	67	52	56	55
5.	62·2	75·0	54·4	72	53	62·5	63	48	57½	52
6.	62·0	68·6	56·8	70	42	63	63	48	54	54
7.	66·3	79·8	54·0	75	58	63	61½	43	60	55½
8.	69·3	72·2	61·3	80	58	68·5	62	48	58½	57
9.	69·2	77·0	63·2	82	57	67	62	52½	59	54
○ 10.	59·0	78·8	59·3	68	44	57	68	40	58	54
11.	58·3	66·3	52·5	72	46	60·5	66	45½	58	55
12.	64·7	70·2	56·0	77	47	61	68½	47	66	52½
13.	57·8	74·0	56·5	78	60	65	71	52	59	55
14.	66·0	72·2	58·4	79	59	66	72½	51	60	55
15.	65·7	74·2	62·7	82	60	64	69	58	58½	54
16.	66·8	75·2	63·3	74	55	66·5	78	59½	61	56
17.	64·7	69·7	60·3	80	55	63	77	51	60	56
☾ 18.	68·7	75·8	63·2	84	59	65	79	55	60	56
19.	73·2	81·2	63·4	84	61	69	68½	54	64	60
20.	70·3	81·3	66·7	72	47	67	64	44	57	53
21.	59·8	74·2	52·4	71	49	56·5	62½	52	58	54
22.	62·3	68·7	56·3	62	45	61	63	46	60	50½
23.	62·2	70·3	53·4	69	53	60	66½	43	57	52
24.	56·8	71·5	55·0	73	46	58	67	51½	57	54½
● 25.	64·2	66·5	55·2	71	56	62·5	62½	48	58½	53½
26.	64·4	69·6	60·9	75	46	61	64	45	55½	54
27.	58·0	70·5	55·0	75	47	62	62	52	58	54
28.	64·3	70·3	56·3	71	59	63	63½	49½	58	54½
29.	65·2	68·3	63·4	74	59	66	63½	39	58½	54
30.	65·6	72·0	63·5	77	61	62	66	43	55	53½
31.	64·4	71·2	61·7	82	56	62	67	45	58½	56
Mean.	63·9	72·5	58·3	73·96	52·77	62·9	66·3	49·2	58·61	54·46

Days of Month. 1843. Aug.	Wind. London: R.S. 9 a.m.	Chiswick. 1 p.m.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Rain. London: R.S. 9 a.m.	Chiswick.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Dew-point. Lond. R.S. 9 a.m.
1.	s.	sw.	calm	sw.	w.	......	......	·07	......	......	58
☽ 2.	s.	sw.	w.	se.	se.	......	·02	......	......	·36	59
3.	s.	sw.	w.	sw.	s.	......	1·03	......	......	·03	60
4.	s.	sw.	w.	w.	w.	·633	·18	·28	......	·09	59
5.	w.	w.	nw.	w.	sw.	·122	·02	·25	......	......	58
6.	w.	w.	w.	w.	w.	......	......	·11	......	·25	57
7.	s.	sw.	calm	sw.	se.	......	......	......	1·30	......	59
8.	s.	sw.	w.	sw.	e.	......	......	......	......	......	61
9.	sse.	s.	calm	w.	wsw.	......	......	......	......	......	63
○ 10.	nw.	ne.	calm	sw.	w.	......	......	1·22	......	......	62
11.	n.	n.	w.	ssw.	se.	......	......	......	......	......	58
12.	nw.	n.	w.	ssw.	sw.	......	......	......	......	......	60
13.	ne.	se.	calm	ssw.	se.	......	......	......	......	......	55
14.	e.	e.	s.	sse.	se.	......	......	......	......	......	62
15.	e.	s.	nw.	e.	se.	......	·61	·18	0·20	......	64
16.	w.	sw.	calm	s.	se.	·019	·16	·41	......	......	63
17.	sw.	n.	calm	w.	w.	.055	......	·58	......	......	63
☾ 18.	n.	e.	calm	e.	...	......	......	......	......	·17	66
19.	ne.	e.	e.	s.	sse.	......	·01	......	......	......	70
20.	s.	s.	w.	w.	wsw.	......	......	......	......	......	68
21.	nw.	nw.	wnw.	s.	se.	·155	·02	·32	......	·20	58
22.	s.	s.	wsw.	sse&s.	se.	......	·22	......	......	·19	58
23.	s.	s.	w.	s.	s.	·202	·95	·11	1·70	......	58
24.	nw.	w.	calm	sw.	se.	1·408	......	·39	......	......	59
● 25.	s.	s.	sw.	s.	se.	......	......	......	......	......	60
26.	s.	sw.	calm	s.	se.	......	·01	......	......	·10	60
27.	s.	nw.	calm	s.	s.	......	......	......	......	·10	57
28.	s.	s.	calm	se.	se.	......	·05	......	......	·25	61
29.	s.	sw.	w.	nw.	sw.	·036	......	·06	......	·16	62
30.	sw.	sw.	calm	w.	sw.	......	......	·04	0·55	......	63
31.	e.	se.	calm	s.	s.	......	......	......	......	......	62
Mean.						Sum. 2·630	3·28	4·02	3·75	1·84	Mean. 60

THE ANNALS

AND

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No. 78. NOVEMBER 1843.

XXXVII.—*On the Structure and Homology of the Cephalic Tentacles in the Pearly Nautilus.* By Prof. Owen, F.R.S.

To the Editors of the Annals of Natural History.

Gentlemen,

I have been favoured with a letter from Prof. Vrolik, in which he writes: "We found the situation of the soft parts of the Pearly Nautilus in the shell, quite as you supposed and exposed in your first plate. It is, indeed, as if that plate was made from our original. The relative position of the different parts is consequently the same as you fancied that it ought to be, and I am, indeed, happy that I have the opportunity of giving such a confirmatory statement. The only difference should be, that what you call the 'dorsal fold' applied to the involute convexity of the shell has not exactly the form and the position you ascribed to it. According to our observations, the mantle forms, at the basis of what you said to be the hood or ligamentous disc (*n*, plate 1.), a double fold, of which the superior part is thin and loose, the inferior firm and connected with the mantle. This part forms a sort of lip, and the whole fold is applied to the involute convexity of the shell. I am afraid that this will not be completely clear, but I hope that by our future plates our meaning shall be better explained. For the moment this must be sufficient. It shall prove to you that the difference between what you said and what we saw is very small. Perhaps a short indication will be quite enough for the Journal."

I am glad to be able to refer my friend to page 12 and plate 3. fig. 1. *i* of my memoir on the Pearly Nautilus, in which the part of the double fold which he mentions as forming 'a sort of lip,' is described and figured as the 'semilunar ridge from which the mantle is continued to form the concave fold.' Thus the supposed difference disappears.

There is one important point in the anatomy of the Pearly Nautilus to which the learned anatomists and naturalists of Holland, in their notice of the specimen dissected by them, have not

referred, viz. the structure and signification of the sheathed cephalic tentacula.

M. Valenciennes *, confirming without further detail my description of these organs, proposes a different explanation of their analogies: he compares the sheath of the tentacle to the acetabulum or sucker on the arms of the Dibranchiate Cephalopods, and the tentacle itself to the caruncle of the sucker, and he divides these supposed modified and gigantic acetabula into eight groups, corresponding with the eight arms of the *Octopus*. I have, in reference to this ingenious view, re-examined more minutely the intimate structure of the tentacula of the Nautilus, and compared it with that of the arms of the higher Cephalopods, and the following account, from the Hunterian Lectures for 1843, of the structure and homology of the tentacula of the Pearly Nautilus may be acceptable to your readers whose attention has been recently called to the anatomy of that rare and interesting mollusk by the letter of Prof. Vrolik.

"The anterior or muscular division of the Nautilus, which may be termed the head, forms a strong and wide sheath, containing the mouth and its more immediate appendages; its inner surface is for the most part smooth, the outer one divided and extended into many parts or processes. The chief of these forms a broad triangular muscular plate or hood covering the upper part of the head, and presenting a middle and two lateral superficies; the former being traversed by a median longitudinal furrow, indicating the place of confluence of the two large hollow tentaculiferous processes of which it is composed. Each side of the head supports a group of perforated processes or digitations, the largest of which is next the hood, and the rest decrease in size as they descend in position. Exclusive of the short, subocular, perforated process †, the digitations are eighteen in number on each side, disposed irregularly, but all directed forwards, some not reaching as far as the anterior margin of the head, others projecting a few lines beyond it. They are of a conical, subtrihedral form, and are hollow: the large one next the confluent pair which forms the hood has, like that part, a papillose outer surface. Each process contains a long and finely annulated tentacle of a subtrihedral form, with the inner surface incised, as it were, by deeper and fewer cuts (fig. 1. *c*), so as to present the appearance of a number of close-set transverse plates, slightly indented by a median longitudinal impression (fig. 2. *f*). This modification must increase the prehensile and sentient properties of the inner surface of the tentacle,

* Nouvelles Recherches sur le Nautile Flambé, Archives du Muséum, 4to. 1839.

† Particularly described and shown not to be tentaculiferous by M. Valenciennes.

and it is on the corresponding part of the larger and fewer tentacles of the Dibranchiate Cephalopods that the acetabula are developed. The angle between the two outer finely annulated surfaces (*g*) subsides near the end of the tentacle, which thus becomes flattened.

"To the nineteen tentacula which are supported by the confluent and free digitations on each side of the head, two others must be added which project from very short sheaths, one before, the other behind, the eye; the lateral transverse incisions are deeper in these than in the digital tentacles.

"Both mandibles are horny, with their tips encased by dense calcareous matter and their base implanted in the thick muscular parietes of the mouth. They are immediately surrounded by a circular fleshy lip with a plicated anterior border, external to which there are four broad flattened processes continued forwards from the inner surface of the oral sheath, two of which are superior, posterior and external, the other two are inferior, anterior, and more immediately embracing the mouth: the latter are connected together along their inferior margins by a middle lobe, the inner surface of which supports a series of longitudinal lamellæ. On the inner surface of the oral sheath beneath these processes there are two clusters of soft conical papillæ, and on each side of these a group of lamellæ. Each of the four processes, which I have called 'labial,' is pierced by twelve canals, the orifices of which project in the form of short tubular processes from the anterior margin, and each canal contains a tentacle similar to, but somewhat smaller than, those of the digitations. Thus the number of tentacula with which the Pearly Nautilus is provided amounts to not less than ninety, of which thirty-eight are termed digital, four ophthalmic, and forty-eight labial. In the second specimen of this rare molluscous animal, presented to the College of Surgeons by Captain Sir Edward Belcher, R.N., there was a slight difference in number in the digital tentacula of the two sides, nineteen being on the right, and seventeen on the left side. The labial processes in the specimen of Nautilus described by M. Valenciennes contained thirteen tentacles instead of twelve; and some slight variation is not surprising in the number of prehensile organs developed in such unwonted profusion in the Nautilus.

"The retraction of the tentacula is effected by longitudinal muscular fibres, their elongation by transverse fibres. These are not, however, disposed in circular or spiral series, so as to attenuate and lengthen the tentacle by a general compression, but present a more complex and beautiful disposition, by which they diminish the transverse diameter without compressing the central nerve. The transverse fibres (fig. 2. *a*) arise in numerous and

distinct fasciculi from the dense cellular tissue (fig. 2. *b*), surrounding the nerve in the centre of the tentacle (fig. 2. *d*), and radiate at equal distances to the circumference; they divide and subdivide as they diverge, and also send off lateral fibres, which form a delicate network in the interspaces of the rays, especially at the angles: the meshes include the longitudinal fasciculi, the cut ends of which are shown at *c*, fig. 2.

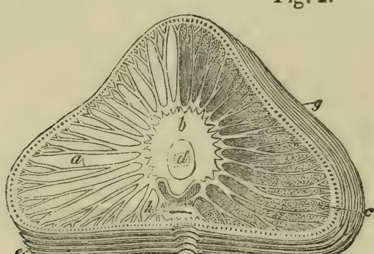
"The mechanical arrangement of the contractile fibres is very similar to that of the complex muscles described by Cuvier in the proboscis of the elephant. The attenuation and elongation of this brobdignagian tentacle must be effected without compressing the central breathing-tubes, and the transverse fibres accordingly radiate from the dense ligamentous tissue which surrounds the tubes: the same prospective contrivance is manifested to prevent the compression of the nerves and vessels in the muscular system of the ninety proboscides of the Nautilus.

"The papillæ upon the exterior surface of the two large confluent digital processes forming the hood, and of the two hollow digitations next in size immediately beneath them, form a remarkable character in the Nautilus, on account of their obvious similarity to tactile papillæ; but the sense of touch must be specially exercised by the numerous cephalic tentacles, which, from their softness of texture, and especially their laminated inner surface (fig. 2. *e,f*), are to be regarded as organs of exploration not less than as instruments of prehension.

Fig. 1.

Inner surface of a tentacle of *Nautilus pompilius*, magnified.

Fig. 2.



Section of tentacle (Nautilus) magnified.

"I shall now submit my grounds for believing that the corresponding organs in the Dibranchiate Cephalopods are the appendages developed from the head, termed 'arms,' 'feet,' 'tentacles,'

and 'proboscides.' They have no hómology with the locomotive members of the Vertebrata, but are analogous to them, inasmuch as they relate to the locomotive and prehensile faculties of the animal.

"The eight arms of the *Octopus* commence by a hollow cone of muscular fibres, attached by a truncated apex to the anterior part of the cephalic cartilage. The fibres are for the most part oblique, and interlace with one another in a close and compact manner as the cone advances and expands to form the cavity containing the mandibulate mouth, at the anterior extremity of which they are continued forward, and separate into eight distinct portions which form the arms. The development of the eight external arms bears an inverse proportion to that of the body: they are longest in the short round-bodied *Octopi*, and shortest in the lengthened Calamaries and Cuttle-fishes, in which the two elongated retractile tentacles are superadded by way of compensation. These latter organs are not continued from the muscular cone, which corresponds with the great cephalic sheath supporting the exterior tentacula in the Nautilus, but arise, like the internal labial processes in that Cephalopod, close together from the cephalic cartilage, internal to the origins of the ventral pair of arms. They proceed at first outwards to a large membranous cavity situated anterior to the eyes, and emerge between the third and fourth arms on either side.

"The internal surface of the arms is that which is specially modified in the Dibranchiate Cephalopods, as in the Nautilus, for the prehensile and tactile faculties; but the structure is much more complicated in the higher order, or Dibranchiata. On this surface each arm supports a single or double series or more numerous rows of acetabula or circular sucking-cups: in the elongated pair of superadded tentacles of the Decapods, the suckers are limited to the expanded extremities, where they are generally aggregated in more numerous and irregular rows. These tentacles serve to seize a prey which may be beyond the reach of the ordinary arms, and also act as anchors to moor the Cephalopod in some safe harbour during the agitations of a stormy sea.

"Each muscular arm is perforated near the centre of its axis for the lodgement of its nerve and artery, which are surrounded by a layer of cellular tissue; from the dense outer sheath of this cellular canal the transverse fibres of the arm radiate to the periphery, intercepting spaces containing the longitudinal fibres of the arm, the whole being surrounded by two thin and distinct strata of fibres, of which the external is longitudinal, and the internal transverse.

"The mechanical structure of the acetabulum may be favourably studied in the *Octopus*, in which those organs are of large size

and sessile. The circumference of the disc of the sucker is raised by a tumid margin; a series of slender folds of membrane, covering corresponding fasciculi of muscular fibres, converge from the circumference towards the centre of the sucker, where a circular aperture leads to a cavity which widens as it descends, and contains a soft caruncle, rising from the bottom of the cavity like the piston of a syringe. When the sucker is applied to any surface for the purpose of adhesion, the piston, which previously filled the cavity, is retracted and a vacuum produced.

"In the *Onychoteuthis* the caruncle supports a long, curved, sharp-pointed claw. These formidable weapons are sometimes clustered at the expanded terminations of the tentacles, and in a few species are arranged in a double alternate series along the whole internal surface of the eight ordinary arms, as they were in the extinct Belemnite.

"In the diminished number, increased size and progressive complication of the cephalic muscular appendages, and in their final modification, in the two long superadded tentacula of the *Onychoteuthis*, for combining with one another to produce a determinate action, we trace the common order which regulates the development of other parts of the animal organization. In our past review of the Invertebrata, we have witnessed this law in the appearance of the more essential organs, as the stomach, the heart, the gills, the generative organs; we find it equally regulating the development of the peculiar prehensile instruments of the Cephalopodic class.

"At first very numerous, comparatively small and feeble, essentially alike, the cephalic tentacles of the Nautilus strikingly illustrate the principle of vegetative or irrelative repetition. Their primary import is however plainly indicated by the direct derivation of their central nerve from the cephalic ganglion; and they present the same complex plan of arrangement of their muscular fibres which characterizes the arms and tentacles of the Dibranchiate Cephalopods. The prehensile surface of the tentacula of the Nautilus is made adhesive after the type of the simple laminated sucker of the *Remora*; the median longitudinal impression which partially divides the lamella may represent the complete interspace which separates into two series, in the arms of most of the Dibranchiates, the more complex suctorial appendages which are developed on their internal surface: but at all events, the reduction of these arms in number, their augmentation in size, and perfection as prehensile instruments by the superadded complications, are phænomena which ordinarily attend the march of development. The order of this progress would be anomalously reversed if the tentacles of the Nautilus represented, as M. Valenciennes supposes, the caruncles of the acetabula, and the hollow

processes of the oral sheath the cavities of those appendages of the arms of the Dibranchiata. According to the French malacologist, the anterior circumference of the head or oral sheath in the Nautilus represents four of the eight arms developed therefrom in the Dibranchiata; and the two dorsal arms consist each of two enormous acetabula, whose cavities are deepened into tubes, and whose caruncles are produced into tentacula as highly organized in regard to their nerves and muscles, as are the acetabuliferous arms themselves in the higher order of Cephalopods. The four other arms of the *Octopus* are represented, according to M. Valenciennes, by the four groups of tentacula which are included within the oral sheath in the Nautilus. Such is not, however, the place of origin of any of the eight arms in the Dibranchiata; nor is it conformable with the general law of development, that a prehensile organ, consisting of two large and highly complicated acetabula in a low organized Cephalopod, should support two hundred smaller and more simple suckers in the higher organized species."

Such are the additional facts and arguments which lead me to reject the new views propounded by M. Valenciennes respecting the sheathed tentacula of the Nautilus, and to uphold the interpretation which I originally gave of their essential nature and analogies. In dissenting from my esteemed friend, I must acknowledge that his peculiar views chiefly stimulated me to that closer investigation of the structure of the tentacula which has led to my observation of the special modification of their internal surface and of the arrangement of their muscular structure,which had been overlooked both by myself in the first description of the Nautilus, and by M. Valenciennes. I shall, in the second edition of my memoir on its organization, add some other particulars of the minute anatomy of the Nautilus, and meanwhile look forward with great interest to the extended memoir of Professors Vrolik and Van Breda, especially in reference to the homologies of the sheathed tentacula. I should wish, in conclusion, to call their attention to the 'elongated pyriform sac' described by me at p. 35. pl. 5. fig. 18. connected with the ventricle, and which does not appear to have attracted the attention of M. Valenciennes.

I have the honour to be, Gentlemen,

Your very obedient servant,

RICHARD OWEN.

London, Sept. 13, 1843.

XXXVIII.—*Description of Six supposed new species of Parasites.* By Henry Denny, Corresponding Member of the Academy of Natural Sciences of Philadelphia, &c.

Amongst the Parasites collected by myself, or forwarded by scientific friends to assist in my investigation of the *Anoplura*, several specimens occurred which did not belong to the above class, and therefore did not immediately claim my attention. Upon examining these however subsequently, and suspecting that some were undescribed and probably new to science, I felt that a short notice of them was required at my hands. I therefore transmit a brief description, with figures of *six species*, &c. for publication in the 'Annals of Natural History,' under a conviction that should any of them eventually prove recognized species, *recent* figures of the same may not be wholly useless. These consist of four species of *Trachean Arachnida*, one of the family *Hippoboscidæ*, and one of the order *Aphaniptera*, which may be characterized thus:—

Class ARACHNIDA.

Order Trachearlæ.

Tribe Acarides.

Genus Ixodes.

1. *Ixodes bimaculatus* (Denny). Subovatus, depressus; capite, thorace, pedibusque pallide stramineis; abdomine coccineo, ruguso, punctato, cum maculis duabus magnis, suborbicularibus, aurantiacis, eminentibus; pedibus interne hepaticis.—Long. 4 lin. Pl. XVII. fig. 1.

Hab. Hippopotamus amphibius, Southern Africa.

Subovate and depressed. Thorax and legs pale straw-colour above, slightly pubescent with a few scattered black punctures. Apex and lateral margin of the palpi dull crimson. Head with two black subtriangular spots in the centre. Thorax very distinct, subcordate, with two black, somewhat undulated, impressed longitudinal lines from the anterior margin to the base, and an irregular diagonal spot from the humeral portion of the lateral margin on each side. Abdomen dull crimson, rugose, punctured, with seven obscurely defined longitudinal furrows, and two large, nearly circular, slightly elevated orange-coloured spots, sinuated on the inner margin. Legs thick and strong, the last joint and the under surface of the remainder clouded with deep liver-colour.

Communicated by A. Melly, Esq., of Liverpool.

DeGeer figures and describes a species of *Ixodes* (*Acarus sylvaticus*) obtained at the Cape of Good Hope by Sparrman from a land tortoise, which agrees with this in many respects as to colour; but from his silence as regards the very characteristic orange

spots on the abdomen, together with the legs of his species being a *dull brown,* while those of the above differ so materially on this point, I consider myself justified in characterizing it as a new species.

2. *Ixodes Hippopotamensis* (Denny). Subovatus, subconvexus, pallide stramineus, lævis, cum lineis nigris, submarmoratis seu reticulatis ; pedibus flavo-albis, interne hepaticis.—Long. 3 lin. Pl. XVII. fig. 2.

Hab. Hippopotamus amphibius, South Africa.

Subovate and rather convex, pale straw-yellow, smooth, with a few scattered impressed punctures. Thorax indistinctly defined, with a bifurcated black line on each side, extending from the insertion of the occiput to the posterior margin, where they become nearly united. Abdomen reticulated by a number of black markings, which form a series of irregular blotches round the lateral margin, and one large patch in the centre. Legs paler than the body, thick, strong and hairy; the inferior margin obscurely toothed; under surface deep liver-red.

Communicated by A. Melly, Esq.

3. *Ixodes Rhinocerinus* (Denny). Ovatus, subconvexus, cum puncturis aliquot magnis ; nigris, lævibus, et maculis multis, magnis, aurantiacis ; pedibus aurantiacis, cum annulis obscure rufis, superficie interna irregulariter dentata.—Long. $3\frac{1}{2}$ lin. Pl. XVII. fig. 3.

Hab. Rhinoceros bicornis, South Africa.

Ovate, somewhat convex, black and smooth, with a few large punctures scattered over the surface. Head and palpi orange-yellow, the former darker at the occiput. Thorax obscurely defined, subcordate, with a broad interrupted orange margin. Abdomen with *six* large irregular orange blotches in the centre, and a series of smaller ones round the lateral margin, divided by *eleven* impressed lines posteriorly, and united by a semicircular transverse one. Legs orange-yellow, thick and strong, the last joint and the basal portion of the remainder with a deep red annulus; the inferior margin acutely but irregularly toothed and armed with stiff hairs.

Communicated by A. Melly, Esq.

DeGeer describes and figures an *Ixodes* from the Rhinoceros (*Acarus Rhinocerotis*), which in certain points resembles the above so nearly, that I felt some doubts as to whether they might not be the same species at different ages, or extreme varieties. But he says, "*Subrotundus, planus, fuscus, maculis testaceis fusco-punctatis.*" Again, "*Les huit pattes sont du même brun obscure que le corps.*" Now in the first place our insect is *not fuscous,* but *black*; and secondly, the feet are not of the same colour as the

body; and lastly, the very prominent character of the strongly dentate inferior margin of the legs is not alluded to, which therefore appears to favour my supposition that the present species is not the *Rhinocerotis* found by Sparrman at the Cape, but a distinct and undescribed *Ixodes* also infesting the *Rhinoceros bicornis.* It is however by no means improbable that the *Rhinocerotis* was obtained from a different species of Rhinoceros, as at the period when Sparrman visited Africa, and long afterwards, all the individuals which might have been seen were confounded under the appellation of *Rhinoceros Africanus*; since which, owing to the discoveries of Burchell and Smith, two other well-marked species have been found inhabiting the same continent, either of which might have occurred to the Doctor while exploring the interior, and supplied the specimen described by DeGeer.

This and the two preceding species formed part of the collection obtained in South Africa for the Earl of Derby by Mr. Burke, and which his lordship was kind enough to apprise me of under an impression they were belonging to the peculiar family of Parasites I am at present investigating.

4. *Ixodes Hydrosauri* (Denny). Orbicularis, planus, subpubescens, fuscus, thorace piceo; pedibus hepaticis, cum albis annulis.—Long. 3 lin. Pl. XVII. fig. 4.

Hab. Hydrosaurus Gouldii? Van Diemen's Land.

Orbicular and depressed, obscure, finely punctured and pubescent. Head and palpi dull red. Haustellum ochraceous. Thorax distinct, subtriangular, pitchy; the anterior margin pale red. Abdomen flat, dull brown, with three or four dark, slightly sunk blotches on each side; posterior margin somewhat crenate, with a series of darker spots alternating with impressed lines. Legs thick, liver-coloured, each joint, the last excepted, terminated by a white band.

Communicated by Mr. Gould.

This species was obtained from one of the large lizards of Van Diemen's Land, known to the colonists by the general name of Guana (most probably the *Hydrosaurus Gouldii* of Mr. Gray), by the above talented and zealous zoologist, and given to me on his return from investigating the ornithology of Australia.

Class INSECTA.

Order Omaloptera.

Family Hippoboscidæ.

Genus Lipoptena.

5. *Lipoptena Pteropi* (Denny). Ochraceus, nitidus, pubescens; oculis maximis, cinereo-cæsus; thorace cum angulis lateralibus

posterioribus et linea centrali castaneis; pedibus longis, crassis; unguibus nigris.—Long. 1 lin. Pl. XVII. fig 5.

Hab. Pteropus edulis, East Indies.

Dull ochraceous, shining and pubescent. Head flat, transverse, as wide as the thorax. Eyes very large, ash-gray. Thorax transverse, with a line in the centre, and the posterior portion chestnut; the base with four large punctures and a series of bristles. Scutellum prominent and semicircular. Wings very small, rudimentary, apparently with only three simple costæ? Abdomen subovate, somewhat pedunculate, flat and coriaceous, with faint indications of five segments? Legs long, thick, pale ochraceous; the apex of the femora with a fuscous spot; posterior pair slightly notched near the extremity. Claws divaricate, black, finely serrated beneath. Pulvilli membranous, ciliated, with a feathered bristle beneath.

I much regret not being able to give more details in illustration of the anatomy of this curious Parasite, which I have been precluded from doing, not only from the small size and mutilated state of the specimen, but from its being the only one in my possession: of the structure of its antennæ and halteres I know nothing, these organs having been destroyed? and from the very rudimentary and obscure nature of the wings, I cannot be positive that my figure is correct. I obtained my example from beneath the wing of *Pteropus edulis* (Black Roussette), commonly called, though inaccurately, the Vampire.

Order APHANIPTERA.

Family PULICIDÆ.

Genus PULEX.

6. *Pulex Echidnæ* (Lewis). Castaneus, splendens; margine singulorum segmentorum totius corporis superiori cum setis nigris pectinato; pedibus crassis, aureo-flavis, interne castaneis, cum tarsis castaneis.—Long. 2 lin. Pl. XVII. fig. 6.

Hab. Echidna Hystrix, Van Diemen's Land.

Bright chestnut, shining and shagreened. Head nutant. Eyes prominent, silvery white. Antennæ distinct; capitate, consisting of four joints; the first somewhat cup-shaped, produced on one side; second very small, subglobular; third short, subconical; fourth very large, oval, pale yellow, marked with transverse striæ; situated in the temporal sinus. Thorax long, conical, *apparently*? consisting of five segments*. The first three, composing the prothorax,

* I have used this expression in consequence of authors differing as to the number of segments in the thorax of *Pulex*. Mr. Curtis says, under the genus *Ceratophyllus*, "Thorax composed of several segments;" Mr. Westwood, "Thorax composed of three short segments," vol. ii. p. 491.

narrow and unequal; the fourth and fifth, forming the mesothorax and metathorax, considerably enlarged, the lower portion of each prolonged backwards into a tongue-like process and thickly punctured. Alary plates moderate; sutural margins of the thorax and abdomen ciliated above and below with large black bristles. Abdomen somewhat truncate posteriorly. Legs thick, orange-yellow; under surface of the femora, apex of the tibiæ and tarsi deep chestnut, densely armed with pitchy spines. Trochanters very large, flat and securiform; anterior femora somewhat sigmoid.

The specimen of this *Pulex* in my possession was given to me by Mr. Gould, who found it on the *Echidna Hystrix* (Australian Porcupine) in Van Diemen's Land. Presuming it to be an undescribed species, I proposed for it the specific name of *Echidnæ*. Several months subsequently however I found, on reference to Mr. Westwood's invaluable storehouse of entomology (the 'Modern Classification of Insects'), that he had also a specimen of *Pulex* from the same quadruped, sent to him from the same locality by Mr. R. H. Lewis, with the MS. name of *Pulex Echidnæ*. As there is every probability that the two insects are of the same species, I make no hesitation in quoting Mr. Lewis as the original identifier, his specimen having doubtless been examined and named before mine. This species resembles in some points the *Pulex Gigas* of Kirby (Faun. Bor. Amer. p. 318. pl. 7. fig. 9.), and is of nearly the same magnitude; and although it is unknown from what animal Dr. Richardson obtained it, yet, as the localities of the two are so wide asunder and the zoology of the countries so different, I feel justified in considering them specifically distinct.

The specific character of *Gigas* is as follows :—"*Ovatus, luteo-testaceus, nigro-setosus; thoracis segmento primo apice setis pectinato; secundi basi nigra; antennis brevissimis, conicis; femoribus compressis, subovatis latissimis.*"

EXPLANATION OF PLATE XVII.

Fig. 1. *Ixodes bimaculatus.*

Fig. 2. ——— *Hippopotamensis.*

Fig. 3. ——— *Rhinocerinus* : 3 *a*, under view of the palpi and haustellum; 3 *b*, posterior leg of ditto.

Fig. 4. ——— *Hydrosauri*: 4 *a*, upper view of the palpi, &c.; 4 *b*, posterior leg of ditto.

Fig. 5. *Lipoptena Pteropi*: 5 *a*, anterior leg; 5 *b*, upper view of the tarsus; 5 *c*, penultimate joint of tarsus, showing the ungues, pulvillus and setæ; 5 *d*, single unguis much enlarged, showing the serrated underside; 5 *e*, wing; 5 *f*, one of the eyes; 5 *g*, the pulvillus and setæ removed.

Fig. 6. *Pulex Echidnæ* : 6 *a*, magnified view of the head with the antennæ *in situ*; 6 *b*, antennæ; 6 *c*, posterior leg; 6 *d*, anterior leg.

XXXIX.—*On the Inflorescence of* Fedia olitoria, *and its order of expansion.* By G. Dickie, M.D., Lecturer on Botany in the University and King's College of Aberdeen.

In the latest works on British plants, Sir W. J. Hooker's and Mr. Babington's, the inflorescence of the different species of *Fedia* is described as follows:—

Fedia olitoria. Flowers capitate (Hooker); flowers in compact terminal heads, involucrated with oblong linear bracteas (Babington).

F. carinata. Flowers capitate (Babington).

F. auricula. Flowers corymbose, a sessile flower in the forks (Hooker); flowers distant, in the forks of a repeatedly dichotomous panicle (Babington).

F. dentata. Flowers corymbose, a sessile flower in the forks (Hooker); flowers corymbose (Babington).

F. eriocarpa. Corymb condensed (Babington).

From which it would appear as if there were in the British species of this genus, examples of three different kinds of inflorescence, viz. the capitulum in *F. olitoria* and *F. carinata,* the panicle in *F. auricula,* and the corymb in *F. dentata* and *F. eriocarpa.*

In the only species which has come under my observation in the fresh state, viz. *F. olitoria,* the general order of expansion is certainly not that which characterizes the simple capitulum; I was hence induced to examine more particularly the nature of its inflorescence. After careful inspection of numerous specimens, the cause of the apparent anomaly became very evident. The stems are invariably forked, the dichotomy being repeated four times; a single flower in the axil of each fork, the lowest flower expanding first, and so on in succession upwards. Each subdivision stands at right angles to the preceding and is subtended by two leaflets, which only differ from those on the lower part of the stem in being smaller and narrower; they cannot however be considered *bracteas* as usually described, since their relation to the flower is different from that occupied by a *bractea* as generally understood. On examining dried specimens of some of the other species, I was induced to believe that the same general arrangement exists also in them; so that Mr. Babington's description of *F. auricula* is also applicable to the others, omitting, however, the expression *distant,* for in some of the others the inflorescence is more condensed, owing to the shortening of the stems.

It may hence be inferred, that the nature of the inflorescence cannot be employed as a means of distinguishing the British species of *Fedia,* it being the same in all, only in some being lax and in others more dense. It has been already stated that the dicho-

tomy of the inflorescence in *F. olitoria* is usually (invariably ?) repeated four times ; it would be desirable therefore to ascertain if there be any regularity in the number of divisions in the inflorescence of the other species.

In connexion with this subject, I cannot omit stating my belief, that British botanists have paid too little attention to the order of expansion of the flowers of our native plants.

The important inferences which may be deduced from observations on this subject were long ago pointed out by Mr. Brown, in a paper in the twelfth volume of the 'Transactions of the Linnæan Society.'

XL.—*Upon the Anatomy of* Phalangium Opilio (*Latr.*). By Alfred Tulk, M.R.C.S., M.E.S.

[Concluded from p. 253.]

[With a Plate.]

The *female* organs of generation occupy a similar position within the abdomen to those of the male, and are composed of the following parts, viz. an ovipositor contained like the penis within a sheath, and an ovisac and ovarium.

The *ovarium* (Pl. V. fig. 26. O) is a white, delicate and transparent membranous tube traversing the whole circumference of the ventral aspect of the abdomen, and returning into itself anteriorly at a point (O^c) where it opens into the ovisac. It is in relation above, with the under surface of the digestive sac and fatty mass; beneath, with the terminal portions of the ovipositor, the oviduct and abdominal nervous ganglia; while upon either side it dips deeply down under the coxæ of the posterior pair of legs, where the two tracheal trunks pass over it near to their origin. The anterior half of this tube (O^a) is narrow, and it widens out gradually behind for the remainder of its extent, to contain a great number of ova in different stages of their development, from the size of a small pin's head to those which are scarcely visible to the naked eye. I have constantly observed that the largest or most advanced ova were situated in that part of the ovarium nearest to the ovisac, or most internally (Pl. V. fig. 27.). Each ovum is retained in a separate cæcal pouch of the ovarium, which surrounds it closely, and can be seen only upon rupturing it and allowing the ovum to escape. I have never met with ova in the anterior part of the ovarium, which contained instead irregular patches of an opake granular matter.

The next organ, the *ovisac* (Pl. V. figs. 26 and 27. *U*), occupies the space included within the inner circumference of the ovary, being in contact superiorly with the fatty mass, and crossed

above by the medio- and lateral abdominal nerves. It consists of two chambers of considerable size and conical in form, with their apices directed forwards, which communicate by a constricted portion (*) with each other, this last being, in the natural relation of parts, covered from below by the sheath of the ovipositor as it lies along the median line. The right chamber, somewhat the largest, opens by its small extremity into the ovarium, marking where that organ returns into itself, while the left gives origin to the oviduct. In an undistended state they occupy but a comparatively small space in the abdominal cavity, but when filled with ova (Pl. V. fig. 27.) their size is so much increased, as, along with the ovipositor and its retractor muscles, to be almost the only parts seen upon removing the ventral integument. It is in these chambers that the ova in all probability acquire their final coverings and development previous to being laid.

The *oviduct* (Pl. V. fig. 26. *ov*), broad at its commencement, appears like a continuation of the left chamber, from which it curves backwards, and makes several folds as a long narrow tube lying beneath the ovisac. Its direction is then forwards, to enter the base of the ovipositor, and it crosses in one part of its course the left retractor muscle of that organ. Its length is about twice that of the ovipositor, and its texture, as well as that of the anterior part of the ovarium, must be very extensible, to admit of the passage of ova through such narrow and seemingly disproportionate canals.

The *ovipositor* is an elongated, flattened and carinate organ (Pl. V. fig. 28.), grooved upon its upper aspect, which lies, included within its sheath, along the median surface of the abdomen immediately beneath the integument, through which it is visible externally as a dark line; a character by which, independently of the greater size and convexity of the abdomen, the female may be at once readily distinguished from the male of *P. Opilio*. It is lodged partly within the concavity of the sternal plate, near to the free border of which it terminates, and its length is about half or two-thirds that of the abdomen. Above, it is in relation with the anterior part of the ovarium, the constricted portion of the ovisac, and the oviduct, and on the sides with the branches of the medio-abdominal nerve and the lateral margins of the sternal plate. It is composed of a series of horny rings (Pl. V. fig. 28. *a*), thirty-three in number, which increase in transverse width from the posterior extremity to about the middle of the organ, whence they diminish again towards its apex. They are furnished each with a single row of bristles having elevated bases, and two of which project horizontally outwards from the seven or eight anterior annuli beyond either side of the ovipositor, diminishing however in length and number behind these segments. The first and one or two last

annuli are paler in colour than the rest, and nearly obsolete. Anteriorly the ovipositor terminates by two organs of peculiar construction. These consist of a pair of short, obtuse and somewhat conical appendages, freely articulated to the last ring, and opposed to each other so as to constitute a kind of forceps, which must serve admirably for laying hold of the eggs as they issue from the ovipositor, and depositing them in their appropriate nidus. They are composed each of two joints: the basal (Pl. V. fig. 29. *b*), somewhat quadrate in form, has its outer border elliptical and provided with two or three bristles, equalling it in width and standing out at right angles from the side of the joint. Its outer side is dark, and of a horny texture like the annuli. The second or terminal joint (*c*) is longer and narrower than the preceding one, the internal margin straight and membranous, being prolonged forwards into a blunt conical point. Upon the outer side of this joint, near to its apex, is a slight depression, which lodges a small brush (*d*) composed of several short obtuse spines, implanted upon a rounded elevation within it. What the use of these singular appendages may be, it would be interesting to ascertain. Long bristles, seated upon tubercles, extend outwards from the above joint and are shortest upon its apex. The annuli of the ovipositor are connected together by a tough intervening membrane, perfectly distinct from that which lines the entire organ (Pl. V. fig. 28. *m'*), a continuation of the oviduct, and upon which impressions of the rings may be often seen to be faintly traced. Behind, where the annuli cease, the membrane connecting them is reflected outwards and upwards, and it is an extension of this fold over the entire ovipositor which constitutes its next portion, or

The *sheath*, one indeed of the most remarkable structures that has been as yet met with in *Phalangium*. It consists of a thin membrane, thrown into transverse folds, and covered over densely throughout nearly its entire extent with short, obtuse and conical spines. Upon viewing it under a low power, this membrane appears as if crossed by numerous lines, and that, at the points where the latter intersect each other, small stars or trident-shaped spines were placed. This, which forms a very beautiful object under the microscope, seems to be, in part, produced by the divergent shadows from the really simple conical spines cast upon the membrane beneath, and partly by a curious puckering of the latter around the base of each spine. But that this appearance, whatever be its real production, is false, may be determined by submitting a portion of the sheath to a power of 570 or even 1020 linear, when the structure of the spines may be satisfactorily demonstrated to be such as was just stated; more especially if, as sometimes happens, in placing it between two slips of glass for

examination, a few of them have become detached from the surface of the membrane. Another peculiarity of this sheath is its very high degree of elasticity, as it may be stretched to three times its natural length without rupture, resuming with a spring its former position and extent when the tension is removed. When within the abdomen, the sheath of the ovipositor is seen to be of a blackish colour, but this is due to its numerous transverse folds and the spines upon its surface, since the more it is drawn out the lighter it becomes, until the true white colour of both membrane and spines is rendered visible. In the unextruded condition of the ovipositor the spines are situated upon the internal surface of the sheath, lying closely appressed thereon, with their points directed forwards; but when these parts have been everted, which is effected in a similar manner to those of the male, they stand out externally, giving to the outline of the sheath an irregular surface, very different from that which it had within the abdominal cavity. The spines cease at a little distance from the termination of the sheath anteriorly, by a somewhat abrupt transverse line, and are continued outwards into two curved and stiff folds of the membrane upon either side, analogous to the hooks in the sheath of the penis, their use in both sexes being apparently to keep the orifice of the sheath open, so as to offer no obstruction to the egress of its contained organ. The naked membrane of the antero-inferior part of the sheath is continuous with an inflection of the sternal lip.

Besides the sheath already described, there is yet another of a white colour (Pl. V. fig. 26. *ms*) which invests it more loosely, and which is formed by a single layer of ultimate fibrils of large size, arranged in a parallel and longitudinal manner side by side, and united so as to constitute a thin muscular tube over the reflected portion or true sheath of the ovipositor. Near to the anterior termination of the latter organ these fibrils diverge from their straight course upon either side, and are aggregated together to form a pair of muscles directed obliquely backwards. The most posterior, the broader and shorter of the two, is of a flattened and triangular shape, and attached by its apex to the sides of the base of the sternal plate; the anterior is long and narrow, its fibres divergent internally and continuous like those of the preceding with the sheath, its external extremity being blended with that of the posterior muscle and attached along with it. This muscular sheath does not terminate at the posterior end of the ovipositor by a free margin, but is reflected inwards upon itself, part of its fibres being obviously continuous with those of the retractor muscles, while some are probably prolonged onwards over the oviduct to constitute an external contractile coat. After

repeated examinations of the structure of the above sheath* under the microscope, and that also already alluded to as investing a corresponding part of the male organs, I feel convinced of its muscular texture from having observed that these longitudinal fibrils, which are continuous from one end of it to the other, are composed each of a single row of disc-shaped particles inclosed within a distinct sheath. Some of these may be seen separated like beads from each other, but still connected by their sarcolemma; others lying obliquely upon each other like pieces of money, and when seen directly from their edge in apposition, they give rise to the appearance of the transverse striæ.

The retractor muscles of the ovipositor (Pl. V. fig. 26. *rm*) diverge slightly from the base of that organ, to which they are attached, to be inserted into the penultimate dorsal arc, as in the male.

In addition to the above organs are two long slender cæcal tubes, which lie along the under surface of the muscular sheath of the ovipositor, and contain in their interior a granular substance. They are accompanied each by a delicate tracheal vessel, which winds spirally round and ramifies upon them, and they appear to open into the oviduct upon either side where it is entering the ovipositor. From their form and position, these tubes may perhaps be regarded as analogous to the *gluten-secretors* of insects.

A considerable degree of interest is attached to the generative organs of *P. Opilio* in both sexes, from its having been first stated by Geoffroy†, and afterwards by Latreille in his 'Hist. Nat. des Fourm.,' that this species was merely the female of *P. cornutum*. In a memoir contained in that work (sur la génération des Fau-

* Subsequently to receiving the proof sheets of this portion of my paper, I found that I was in error with regard to one point in the structure of the *muscular sheath* of the penis and ovipositor of *Phalangium*. What I have there described as ultimate fibrils are narrow and elongated *fasciculi*, which, by the pressure to which they have been submitted in placing them between two slips of glass for examination, have become separated by *transverse cleavage* into the *disc*-shaped bodies alluded to. If however the surface of these be carefully examined, it is seen to be minutely granular, an appearance produced by the numerous fibrils they contain, each of which is made up by rows of *primitive particles* or *sarcous elements* of Bowman, splitting in the direction of the transverse striæ. It was owing to my having overlooked this peculiar structure of the discs, the $\frac{1}{4}$-inch power of my microscope being hardly sufficient to define it clearly, that the mistake has arisen. The sarcolemma invests as a delicate membrane these fasciculi, which in this sheath of *Phalangium*, instead of being aggregated together in bundles to form a solid muscle, as in the legs and other parts, remain distinct from and in parallel apposition with each other, so as to form a hollow tube.

† Hist. Abrégée des Insectes, 1762.

cheurs), the latter author has described at length and in very graphic language the preliminary contests among the males and subsequent copulation between several individuals of *P. cornutum* and *Opilio*. His concluding words are, "D'autres individus célèbrent aussi leurs noces en ma présence, et le fait que j'ai avancée ne saurait être contestée." Treviranus explains these conclusions of Latreille, to which he was led, in the first place, by having met, in dissection, with male organs only in *P. cornutum* and female in *P. Opilio,* by observing that the separate occurrence of the sexes at certain periods is not uncommon among apterous insects, and further, that a hybrid union might have been taking place among the specimens witnessed by that observer. If indeed this conjecture be correct, it is not surprising that the anomalous fact of several individuals of opposite species, though very different in outward form, congregated for the purpose of copulation with each other, should have deceived even so accurate an observer as Latreille. From what little I have observed myself of these two species, I believe they are essentially distinct from each other. I have already pointed out the slight modifications of external form which characterize the sexes of *P. Opilio,* and among the numerous specimens of the latter which I have dissected, have met with a very fair proportion of males to females. With regard to *P. cornutum,* which is abundant in pastures and on the chalk hills under stones about Dover, I seldom met with *P. Opilio* associated with it, this species affecting rather the whitened walls of outhouses than the open country. Hermann, Herbst and Hahn, all moreover describe these species as distinct; the latter indeed has given drawings of the male and female of *P. cornutum,* observing of them, "beide Geschlechter traf Ich oft in Begattung an;" and of *P. Opilio,* "Nach Latreille soll diese Art das Weibchen von *P. cornutum* seyn, allein Ich traf solches noch niemals mit Jenem in Begattung, wohl aber sehr oft die beiden Geschlechter dieser Art mit Brust an Brust gedrückt, und mit den Fühlfüssen sich umklammernd im Begattung an."

In his description of the position of the bodies of the male and female during coition, Hahn in the passage just quoted has confirmed the observations made upon this point by Latreille, who furnishes, however, in addition the following remarkable though rather indistinct statement:—"L'accouplement a lieu et dure trois à quatre secondes. Il n'en résulte aucune adhésion comme dans un grand nombre d'insectes. La réunion vient de s'opérer, et le male ne laisse apercevoir aucune marque caractéristique de son sexe." The inference from this is, that no actual introduction of the male organ into the vaginal orifice of the female is effected; and certainly, when the position of their bodies is taken into account, and that the glans of the male, with the opening for

the exit of the seminal secretion, is turned *from* instead of *towards* the female, and from its mode of articulation with the body of the penis, cannot be bent in the opposite direction, a mechanical difficulty is suggested which serves to support the account given by Latreille. More detailed and careful observations are much needed upon this subject, as should the generative function be performed in the manner described above, without true intromission, what then can be the use of the well-developed condition of the male organ ?

Nervous System.—In the conditions of their nervous system the *Phalangia* conform very closely to the type of structure exhibited by the *Anourous* Arachnida. Owing to the relative position of their oral organs, which, from the absence of a distinct head, are removed inferiorly upon a level with the coxæ of the legs, of which indeed they are but modifications, the anterior or *cephalic* (Pl.V. fig. 31. *cg*) mass is placed in *front* instead of above the œsophagus, the latter bending obliquely downwards, after crossing the thoracic ganglion, to reach the above structures. It consists of two oblong and obtusely conical ganglia of a grayish white colour, the apices of which are directed forwards, their bases prolonged into two short crura which connect them to the sides of the anterior margin of the thoracic ganglion, and leave an elliptical opening (*) through which the œsophagus passes. They are invested together by a loose neurilemma, and give off at least three distinct nerves. The middle one, of large size, arises by a common origin, somewhat dilated, and divides about its middle into two trunks (*on*), which pass upwards between the anterior cæca of the alimentary canal, the muscles of the cheliceræ and maxillary palpi, to expand upon the inferior surface of the central conjoined pair of eyes. The two others (*lo*) are much smaller, and are directed outwards to the lateral eyes.

Conditionated by the amount of nervous energy required for setting in motion the long and filiform extremities and sustaining upon them the weight of the body, the *thoracic* ganglion (*tg*) is of great extent, occupying nearly the whole lower surface of the cephalo-thoracic cavity. It is of a paler colour and firmer texture than the cephalic, apparently made up by the union of two or more ganglia, and consists of a transverse portion lying behind the œsophagus, the anterior and posterior margins of which are elliptical and well-defined, and of two lateral prolongations extending forwards and backwards upon either side of the above. Anteriorly these reach as far as the extremities of the cephalic ganglia, curve slightly downwards, and give off a nerve from their apex and one also from their internal margin, while behind they are very short and obtuse, and furnish each a large trunk to the posterior pair of legs, three others (*cn*) being distributed from

their external border to the remaining extremities. Three branches arise from the posterior margin of the transverse portion, to supply the contents of the abdomen. A medio-abdominal nerve (*m*), which passes beneath the transverse tracheal vessel, and above the ovarium and ovisac in the female and seminal vessels in the male, and divides into two branches (*ag'*), furnished with pyriform ganglia of considerable size. Beyond these ganglia the branches are continued for a short distance, when they unite by a transverse filament (* *) and subdivide into delicate nervous threads, few in number, which again communicating, form an open net-work of nervous fibre, distributed to the ovarium, oviduct and tissue of the corium. The two external or latero-abdominal nerves divide each near to their origin into two others, the outermost of which (*gg*), very short, presents occasionally two gangliform swellings upon its course, and gives branches to the generative organs near to their external opening. The inner pair (*ag*) pass backwards almost parallel with the central cord, and provided also with ganglia divide, according to Treviranus, into three filaments which spread out upon the under surface of the alimentary canal and adjacent viscera. The thoracic ganglion is in relation in the middle, above and posteriorly, with the transverse tracheal vessel, laterally with the main tracheal trunks, and beneath with the termination of the ovipositor (Pl. V. fig. 33. *t*).

It was important to ascertain if, in the structure of the ganglionic centres of the nervous system in *Phalangium,* there was any indication of a separation into two distinct tracts, such as have been described in insects as representing the motor and sensitive columns from which the spinal nerves arise in the Vertebrata. With this view I have examined under the microscope the thoracic as well as the abdominal ganglia, and find that in both they are composed of an aggregation of globules, very distinct in the first, where they resemble somewhat vesicles of fat, which have coalesced together so as to form an irregular kind of net-work. The nervous fibres which pass either to or from these ganglionic enlargements appear to cease abruptly when they arrive at the latter, and become, as it were, amalgamated with their structure. I mention briefly these facts here because they offer additional evidence, to that which has already been so admirably adduced by Prof. Owen in his Lectures upon the Crustacea† during the present year, of the falsity, or, at least, non-universality, of the above analogy, as applied to the Articulated animals. The most striking peculiarity connected with the nervous system of the *Phalangia,* is the presence of several large transversely striated muscular

† Lectures on the Comparative Anatomy and Physiology of the Invertebrate Animals, 1843.

fasciculi which radiate from the sides of the thoracic ganglion, where they are attached by short tendons. Their arrangement is such, that, according as either one or the other set of fibres act, they will draw the nervous mass either forwards or backwards, horizontally, or in the vertical direction. I am not aware that this voluntary power of moving the nervous centres exists in any of the other Articulata.

Organs of Sense.—With the exception of that of vision, the precise location of the other organs of sense in *Phalangium* rests, for the most part, as in insects, upon conjecture. A very delicate touch no doubt resides in the extremities of the palpi, and the slender terminations of the anterior and two hindermost pairs of legs, while the second pair, longer than the rest, and which the harvest-spider keeps raised, chiefly in resting, from the surface, may serve to convey the vibratory impulses of the atmosphere, and thus apprise it of any coming danger. The form of the cheliceræ, the usually regarded analogues of the antennæ, would seem to ill adapt them for the auditory function. The eyes are four in number, as stated in the commencement of this paper, two being situated in the centre of the cephalo-thoracic shield, and the other pair near to its anterior angles. In the first of these, the large size, prominence, and elevated position of which, appear to supply their deficiency in number as contrasted with the median ocelli of the Araneida, I have succeeded in tracing out similar structures to those described by Müller and others as composing the eye of the scorpion; namely, first of all a layer of black pigment, retained doubtless in place by a choroid coat, which is thicker laterally than above and below, and which must support upon its inner surface the nervous expansion of the retina; secondly, a vitreous humour, seen as a convex transparent spot imbedded in the centre of the pigmentary layer; and lastly, a minute, round and compressed crystalline lens formed of concentric laminæ, and apparent in the living animal through the cornea, which is simply a smooth transparent portion of the general integument of the body. At fig. 32. *om* are represented a pair of muscles, passing upon each side beneath the middle pair of eyes, which are united laterally to each other. Their use must surely be to effect some change of position in the internal humours of the eye beneath their immoveable cornea, and so accommodate them to the movements of the thoracic ganglion, and through it the cephalic and optic nerves, when acted upon by its powerful muscles. One fact is deserving of notice, as tending to throw some light upon this opinion,—that in every specimen of *P. Opilio* from which I have removed the cephalo-thoracic plate, the layer of pigment with the vitreous humour has invariably remained attached to the extremity of the optic nerve, leaving the crystalline

lens behind the cornea, and thus indicating their great freedom of connexion, if indeed any exist. The lateral pair of eyes are not nearly so distinct and prominent as the above, and would appear to be wanting altogether in certain species, as in a specimen of *P. quadridentatum*, I have been unable to perceive the slightest traces of their existence.

Respiratory System.—The respiratory organs of the *Phalangia* consist of two large tracheal trunks (Pl. V. fig. 33.), situated upon either side of the cephalo-thoracic cavity. They commence from two stigmata, which open externally between the posterior coxæ and under surface of the abdomen, and from thence they pass inwards, forwards and slightly upwards, converging towards each other at their anterior termination. In their course are several slight dilatations, where large branches are given off. From the oblique position of the posterior coxæ, these trunks have to curve somewhat abruptly round their convexity, and owing to the narrow space in which the spiracle lies, are compressed and smaller in calibre at that particular point. Their different relations from behind forwards are as follows:—As they emerge from beneath the posterior coxæ they pass over a part of the ovarium, which has been said on a former occasion to dip deeply down there upon either side, and are then situated for the remainder of their course upon the inner extremities of the coxal joints resting partly upon the muscles passing into these open cavities, while near to their anterior extremities, they overlie the sides and crural branches of the thoracic ganglion. These trunks are somewhat remarkable for their large size and short course, and are readily distinguished from other organs in dissection by their additional pearly lustre. The best mode of displaying them is to commence from the dorsal surface of the animal by removing the heart and all the digestive viscera, and in the female the ovarium and ovisac.

Further than their principal trunks, Straus-Durckheim*, in his recent able work, states, "Je n'ai jamais pu m'assurer de la forme et de la disposition des trachées dans les Holètres." Treviranus, however, long since described and figured the respiratory tubes and their branches, but as this excellent observer has done so in a very general manner, it enables me, after much patient re-investigation, to enter into more minute details. The primary branches, also of considerable size, which proceed from each of the main trunks, are about fourteen in number, the majority of which ramify among the viscera of the thorax, while three only upon either side are distributed to the abdomen. The first of these abdominal air-tubes (*at*) is given off from the internal side

* Traité d'Anat. Comp., Paris 1842.

of the trunk, just before it opens externally in the stigma, and passes directly backwards for some distance undivided, and then ramifies into several branches. The two next branches arise quite close to each other at a short interval from the former. The most external runs also backwards for some extent as a single tube and then bifurcates, each branch resolving itself again into twos and threes, so as to form a leash of long tracheæ, nearly of equal size and parallel to each other. The internal branch divides, not so far as the others from its point of origin, into smaller tubes, and, directed more towards the median line, supplies, with them, the abdominal viscera and generative organs.

The fourth branch (*f*), issuing from the main trunk at an acute angle, is remarkable for its size, which is nearly half the width of that of the latter, and its course, like it, is forwards and inwards, but converging more towards its fellow of the opposite side. After quitting the main trunk it gets beneath its level, and runs to the posterior margin of the thoracic ganglion, beneath which it passes, and there terminates abruptly by a rounded clavate extremity, from which arise three branches. The most posterior of these takes a peculiar direction; it passes transversely inwards, crossing the medio-abdominal nerve and anterior part of the sheath of the ovipositor in the female as at fig. 33, and anastomosing with a similar tube from the opposite side, forms a very delicate arch just behind the thoracic ganglion. From the anterior side of this arch (which has been spoken of above as the transverse tracheal vessel) two long curving and slender tubes proceed forwards, and are probably continued into the maxillary palpi. Treviranus has figured and described an azygos tube as arising between these two and passing forwards, while another given off opposite takes a backward course. I have been unable to detect either of these branches, but have met in some specimens of *P. Opilio* with two tracheæ arising, nearly opposite to the anterior pair, from the arch and entering the abdominal cavity. The two other branches given off from this large trunk run beneath the thoracic ganglion, their terminal ramifications emerging upon either side the optic, and supplying adjacent organs. The main trunk of the tracheal system furnishes but one other branch from its inner aspect which ramifies near to the optic ganglion, and then gradually diminishes in size to form a terminal tube (*tc*), which is intended to convey air into the interior of the cheliceræ, and from the outer side of which several smaller, more or less parallel vessels arise. The branches from the outer side of the main trunk arise in pairs, of which there are four (*ct*), one of each passing along the upper surface of muscles in the coxal joints to supply the legs, while the other goes to the parietes and viscera of the cephalo-thorax. From the divergent position of the

two anterior pairs of legs from the two posterior, there is an interval between the two middle pairs of tubes, greater than between the first and second, or third and fourth pairs. Besides the tracheal vessels above enumerated, their minute subdivisions are distributed most extensively throughout the body, some passing within the body of the penis into the ovipositor, upon either side of the pharynx between its muscles, around the circumference of the ovary, and among the seminal cæca, &c.

As regards the *structure* of the tracheæ in *Phalangium*, I have been unable to detect the existence of a serous or mucous coat distinct from their spiral fibre, but as the coils of this must have some means of connexion, the mucous coat may possibly serve that purpose, in place of being a simple lining membrane to the tube. There is an appearance in these vessels similar to what is met with in the vesicles of insects, and which is due to the presence of an immense number of round spots, which look at first like small openings, and are scattered most abundantly, without any arrangement, over the main trunks, but more sparingly upon the branches, decreasing as they further subdivide. Examined under a power of 500 linear, they are found to consist of two kinds : the larger have a well-defined margin, are least connected to the spiral fibre, projecting in many instances from its surface, and contain in their interior nuclei, which present a slight hyaline tint. At the points where they occur the spiral fibre is uninterrupted. The smaller spots are very minute and dark, and placed between the coils of fibre, appear like simple nuclei, around which a cell had not yet been developed. This structure, upon the real nature and use of which it is very difficult to decide, proves, at all events, that these spots are not partial dilatations of the air-tube, as has been believed by some writers.

The *spiracles* are narrow elongated slits, dividing the bottom of the tegumentary fold between the posterior pair of coxæ and the abdomen. Their posterior margin is inverted to form a triangular, obtuse, deflexed and horny plate (*p*), projecting into the abdominal cavity at a point corresponding with the origin of the second and third abdominal tracheæ. It is unprovided with muscles, but is freely moveable to and fro upon the thinner integument that supports it, so that it may be regarded as a kind of passive valve, serving upon the one hand to strengthen the weakest side of the spiracular orifice; on the other, to yield downwards, so as to admit of the full dilation of the trachea, and again return when the quantity of air admitted into the latter is diminished. It may also serve to prevent compression of the air-tube during the movements of the posterior coxæ, and when the body is greatly distended with ova in the female. The outer margin of this plate

is the longest, and the ends of the slit prolonged into slight grooves.

That direct relation which exists between the development of the respiratory functions and the activity of an animal may be well illustrated in the case of the harvest-spider now before us. "These long leavers," observes one of our old philosophers*, "as I may so call them, of the legs, having not the advantage of a long end on the other side of the *hypomochlion* or centers on which the parts of the leggs move, must necessarily require a vast strength to move them, and keep the body ballanc'd and suspended, in so much, that if we should suppose a man's body suspended by such a contrivance, an hundred and fifty times the strength of a man would not keep the body from falling on the breast." Hence is understood the reason for the large size and dilated character of the tracheal vessels, their principal distribution within the cephalothorax, whereunto the locomotive organs and their powerful muscles are attached, while two or three tubes alone supply with air the abdomen, in the imperfectly constructed segments of which, little, if any, mobility can exist. In this latter respect insects offer indeed a striking contrast to the *Phalangia*.

In concluding these details relative to the anatomy of the *Phalangia*, it might be expected that I should offer some remarks upon the rank and position which they hold among other groups of the Arachnida; but to do so would, I conceive, be to venture upon deductions, to which in the present imperfect state of our knowledge upon the structure of these animals in general, and more especially of the Trachearia, the naturalist is scarcely capable of arriving. For what, it may be asked, is as yet known, or at least, definitively, of the conditions of the internal organs in *Galeodes, Chelifer, Pycnogonum,* and the numerous tribe of *Acari*? Such considerations, while they suggest to others very interesting points of inquiry, will obviously constrain me for the present to the enunciation of facts alone.

EXPLANATION OF PLATE V.

Fig. 26. Female generative organs seen from below, the natural relation of the parts having been slightly disturbed; *or*, the extremity of the ovipositor projecting from its true sheath of a black colour, and which is surrounded by the muscular sheath *ms*; *ng*, *ng*, abdominal nervous ganglia; *f*, fatty mass or liver; 3, 4, coxæ of posterior pairs of legs; D, appendages to second coxal joints.

Fig. 27. The ovarium and ovisac from above, the latter greatly distended with ova; *o v*, the oviduct; *o'*, detached ova surrounded by their vitelline capsules.

Fig. 28. The ovipositor detached from its sheath; twenty only of the annuli

* Hooke's Micrographia, 1665, obs. 47, of the Shepherd-Spider.

are represented; *m'*, lining membrane bearing impressions of the rings.

Fig. 29. A more highly magnified view of the extremity of the ovipositor; *a*, the rings.

Fig. 30. A female *P. Opilio*, with the ovipositor and its sheath extruded from the abdominal cavity.

Fig. 31. The nervous system dissected out and detached from the body. At the point where the branches from the abdominal ganglia communicate, the nervous fibre is observed to be thickened.

Fig. 32. Muscles of the middle conjoined pair of eyes.

Fig. 33. Respiratory system—the integument has been removed from the dorsal aspect to expose the tracheæ; *m s*, muscular sheath of ovipositor, part of which is torn away to expose the true sheath beneath it; *ag*, *ag'*, nervous ganglia; *r m*, retractor muscles; *o v*, oviduct; *ch*, basal joints of cheliceræ; *m p*, maxillary palpi; 1, 2, 3, 4, coxal joints. The transverse part (*t*) of the thoracic ganglion and the cephalic, giving off the optic nerve, *o n*, are also seen in their relations to the tracheal trunks on the left side of the figure; the second and third abdominal tracheæ have been broken off, leaving openings in the main tubes corresponding with their points of origin.

XLI.—*Notice of a new species of Seal* (Stenorhynchus serridens). By Prof. Owen, F.R.S.

In the small and very peculiar group of Seals characterized by the subcompressed and deep-cleft crowns of the molar teeth and by the diminutive claws, two species only have been recorded. The one (*Phoca leptonyx*, Blainville) is the type of the genus *Stenorhynchus*, F. Cuv.; the other, the sea-leopard of Weddell (*Stenorhynchus Weddellii*, Lesson, 'Manuel de Mammalogie,' 12mo, 1827, p. 200), has been described by Drs. Jamieson and Hamilton (Naturalist's Library, 'Marine Amphibia'), and distinguished from the *Stenorhynchus leptonyx*, F. Cuv., by the more obtuse tricuspid molars and the absence (?) of claws on the hind-fins, as well as by the spotted hide.

The skeleton of a seal "from a high latitude in the Australian seas," transmitted to the College of Surgeons by Dr. M'Cormick, surgeon to H.M.S. Terror, shows a modification of the molar teeth, which would give it a better claim to subgeneric distinction than the *Sten. Weddellii* has been supposed to possess*. The three anterior molars on each side of both jaws are four-lobed, two smaller lobes being situated behind the principal lobe and one in front of it; the remaining molars—two on each side of both jaws—are five-lobed, the principal lobe having one smaller lobe in front and three behind it. The lobes are separated by nearly as deep notches as in the *Stenorhynchus leptonyx*, but their summits are obtuse.

* The *Sten. Weddellii* is the type of the subgenus *Leptonyx* of Mr. Gray.

The skin having been left upon the toes of the hind-fins, showed the presence of a very small claw on each of the five digits.

I do not consider the modifications of the compressed and deep-cleft molars of sufficient importance to justify the introduction of a new generic name into the group of amphibious or pinnigrade Carnivora, which has already been overburthened. The new species of *Stenorhynchus,* combining a small head and moderately elongated muzzle, with the peculiarly diminutive claws of the genus, renders requisite, however, a slight modification of the generic character.

Genus Stenorhynchus.

Dental formula :—inc. $\frac{2-2}{2-2}$; lan. $\frac{1-1}{1-1}$; mol. $\frac{5-5}{5-5} = 32$.

Molars subcompressed, deeply notched into three or more lobes; anterior molars with one root, the rest with two roots*.
Head small; muzzle more or less elongated.
Claws diminutive.

Sp. 1. *Stenorhynchus leptonyx,* F. Cuv. Molars trilobate, lobes acute; muzzle slender and elongated.

Sp. 2. *Stenorhynchus Weddellii,* Lesson. Molars trilobate, lobes obtuse; muzzle broad and less elongated.

Sp. 3. *Stenorhynchus serridens,* mihi. Molars, three anterior ones 4-lobate, two posterior ones 5-lobate in both jaws, lobes obtuse; muzzle moderately long and slender.

All the species are limited to the Southern Ocean.

XLII.—*On the Species of the Genus* Limax *occurring in Ireland.* By the Rev. B. J. Clarke, Mem. of the Dub. Nat. Hist. Soc.

[With three Plates.]

During the summer of the year 1840 I supplied Wm. Thompson, Esq., of Belfast, with a list of the species of *Limax* which occurred to me in the Queen's county, for the purpose of introducing them into his 'Catalogue of Irish Land and Freshwater Mollusca,' published in the thirty-sixth Number of the 'Annals and Magazine of Natural History,' and where it appeared as an appendix to his paper. From the limited time allowed me previous to the publication, I had not an opportunity of satisfying myself as to the identity of two species there introduced in a doubtful manner, and which I believed differed materially from any species hitherto described as *British.*

* The translator of Cuvier's 'Règne Animal,' Orr's ed. 1 vol. 8vo, 1840, adds, erroneously, to the generic character of *Stenorhynchus* in the text of the author, "(but with single roots)," p. 98.

Having since that period had abundant opportunities of verifying my former observations, and being fortified by the opinion of naturalists who are more experienced in detecting specific distinctions, I venture now with every confidence to bring them forward as new to the British catalogue. My object in once again noticing the other British species, already known and described, is in order to introduce the new additions in their proper places, and thus afford a greater facility for determining the value of their specific distinctions by comparison.

It is not my intention to include the genus *Arion* in the present communication, as I feel that there are many points, connected with the two species* already described as British, which would require much more attention than I have as yet been enabled to bestow upon them.

In the following catalogue I have adopted the divisional or sectional arrangement made use of by Mr. Gray in his edition of 'Turton's Manual,' but with considerable modifications, rendered necessary in order to include the two new Irish species.

Order PNEUMONOBRANCHIATA.

Fam. Helicidæ.

Genus Limax.

End of tail tapering and destitute of any gland; the pulmonary cavity in front of the body, respiratory hole toward the hinder part of its edge or behind the middle; mantle shield-like, entirely inclosing the shell, which is flat, oval or oblong, without any visible spire. Infra-œsophageal ganglion having two fissures on the under side, presenting on each side of the medial line three gangliform eminences.

* ***Mantle produced behind, marked with concentric striæ; tail partially keeled; shell flat.***

1. *Limax maximus*, Linn. (Pl. X. fig. 1, 2.)
   L. maculatus, *Leach.*
   L. cinereus, *Müller.*
   L. antiquorum, *Férussac.*

" *L.* Cinereus, maculatus et immaculatus, clypeo brevi, corpore striato aut rugoso, apertura laterali subpostica."—*Draparnaud.*

This well-known species appears to be universally distributed over Ireland. The varieties as they occur in Ireland are as follows:—

Var. *α*. Drap. }
Var. *β*. Férus. } " Cinereus immaculatus." *Co. Galway, B. J. C.*

* *Arion hortensis* and *A. ater.*

Var. β. Drap. Var. ζ. Férus.	"Cinereus, clypeo dorsoq. maculis nigris." *Co. Cork, R. Ball, Esq.*
Var. γ. Drap. Var. ν. Férus.	"Clypeo maculis, dorso fasciis nigris." *Queen's co. and co. Galway, &c., B. J. C.* Pl. X. fig. 1.
Var. Nilsson's ? Cinereo-niger.	"Niger, albam carinam." *Co. Cork, R. Ball, Esq.*; *Queen's co., B. J. C.* Pl. X. fig. 2.

This latter variety, of which I have given a figure (Pl. X. fig. 2.), is very remarkable. The middle band of the foot and the dorsal keel are white, the rest of the animal shining black, with a few occasional lighter blotches.

The variety which is of most usual occurrence in Ireland is that of var. ν, Férussac. (Pl. X. fig. 1.)

The internal shell (Pl. X. fig. *a*.) is well described by Dr. Turton.

2. *Limax arboreus* ? M. Bouchard Chantreux, Cat. des Moll. terres. et fluv. du Pas de Calais.

L. glaucus, *mihi*. (Pl. XI. figs. 4 to 10.)

L. Albus flavescens, glauco variegatus, clypeo dorsoque duabus fasciis nigricantibus, tentaculis obscuris.—*Clarke*.

Hab. On trees which are covered with moss, particularly ash and beech.

This species I at first dubiously referred to the *Limax flavescens* of Férussac in my former communication to Mr. Thompson (see 'Annals and Mag. of Nat. Hist.' vol. vi. p. 204), previous to my seeing M. Bouchard's memoir. I there remarked that this *Limax*, of whose identity I was then doubtful, "might perhaps be referred to *L. arboreus*, on account of its possessing certain characters and habits, differing from what is contained in any description of *L. variegatus* or its varieties; I consequently compared my specimens carefully with M. Bouchard's memoir—an opportunity of doing which was afforded me through the kindness of Messrs. Gray and Thompson—and I was much gratified to find a perfect agreement in the specific characters as well as in the peculiar habits of the animal." Subsequent observation has not altered my opinion as to its identity with this species, but not having seen either a drawing or specimen, I am still under the necessity of referring it to *Limax arboreus* with a mark of doubt attached. Should the species be found eventually to be distinct from *L. arboreus* of Bouchard, I have suggested the name of *Limax glaucus* as descriptive of its very peculiar hue.

I shall now give a more detailed description of the species.

Animal of a gelatinous translucency; colour smooth, bluish gray ("*bleu glauque*") or neutral tint colour. Back marked with a whitish band, which commences immediately behind the shield, where it is broadest, and gradually diminishes in width until it

meets in a point at the extremity of the tail, which is sensibly keeled. This light dorsal band is bounded on either side by a dark gray coloured fascia, often irregular and interrupted, beneath which the sides are variously mottled or marbled with dark gray, marked more or less with little pale oval spots, which sometimes separate off another but very irregular fascia. This latter character is not however often apparent. The lower part of the sides pale whitish or yellowish.

The *mantle* is rounded anteriorly, and tapers off to a blunt point posteriorly; it is finely and concentrically striated, and marked on either side with a narrow dark-coloured fascia, which is broadest, and usually darkest, immediately over the pulmonary orifice, and narrows off towards the head; each fascia is again narrowly margined with pale yellowish or whitish, the intervening spaces on the back and sides irregularly mottled and marbled with the same dark colour as the fasciæ. The *pulmonary orifice* is situated toward the hinder extremity of the mantle, small, round, and arched over by the dark lateral fascia, which passes in a circular form above it.

The *head* and *tentacles* are grayish with a slight vinous tinge; on each side of the former the blue retractile nerve is seen through the translucent medium of the neck. The upper tentacles are long in proportion to the lower ones. The *sole of the foot* is whitish, the central band somewhat narrower than the side ones, and remarkably translucent.

The *internal shell* (Pl. X. fig. *b*.) is of an oval form, thin and slightly concave, marked with circular lines as in *Limacella parma*. When just removed from the animal they are translucent, of a membranaceous consistency, but on exposure to the air become of a more opake white with a silvery lustre above. The marginal membrane is well-defined, and being broadest towards the anterior portion, gives to that part of the shell an appearance of greater width, and is narrowed off towards the apophysis of adhesion.

The young (Pl. XI. figs. 9, 10.) are vinous-coloured; the fasciæ in general are more decidedly marked and better defined than in the adults.

This *Limax* is subject to much variety in the markings, both as to quantity and intensity, but scarcely ever varies in colour; sometimes the light dorsal band is obliterated and the body is of a uniform blue-gray colour, sparingly and irregularly marked with streaks of a darker gray. Not unfrequently the animal is of a uniform glaucous colour without any markings, the situation of the light dorsal band being marked out by a few scattered, oval, whitish spots.

I shall now point out a few of the diagnostic characters by which it is distinguishable from all other British species of *Li-*

max. It agrees with *Limax cinereus* in having the hinder extremity of the mantle produced, but in almost every other respect it will be found to differ materially. First, it is much smaller in size, never attaining that of full-grown specimens of *L. maximus.* Secondly, in colour it likewise differs, possessing the peculiar smooth blue glaucous colour and gelatine translucency which in all its stages and varieties serve to point it out. By the markings on the mantle it is also easily distinguishable from *L. maximus,* as the two fasciæ are almost always more or less apparent, and which I have never seen in any of the varieties of *L. maximus.* Thirdly, the keel is much shorter, and does not exhibit that crenated edge which is so conspicuous in *L. maximus.*

To *Limax flavus* it more nearly approaches in size and general contour, but is somewhat smaller and of a more slender form; it may be however at once distinguished by the form of the termination of the mantle, which, instead of being rounded, as in *L. flavus,* is produced and tapers off to a blunt point: this feature is more apparent when the animal crawls than when it is at rest. In colour and markings it is so widely distinct that I need hardly notice them; the presence of fasciæ and its own peculiar glaucous tint will generally serve to distinguish it; and however nearly it may approach to any of the varieties of *Limax maximus* or *L. flavus* in the markings of the body, there will always remain, even in the palest specimens, sufficient traces of the fasciæ on the mantle to mark the species.

The mucus of *L. arboreus* is colourless, whereas that of *L. flavus* is yellow when thrown into hot water.

M. Bouchard's description of the habits of this *Limax*—should it prove to be identical with his—agrees in a great measure with my own observations. He observes:—" They live on trees, but prefer those which are old, covered with moss, and of which part of the wood is rotten; when the weather is cloudy or rainy, they are seen crawling upon the trunks or branches." When seen in this position against the light, they present a very interesting and curious appearance on account of their great translucency, which permits their internal organization to be indistinctly traced. " The mucus of this slug is colourless and very abundant; the animal possesses the remarkable property of emitting a clear cold liquid like the purest water when touched." I find this is only to be observed when the animal is first taken in the hand from off the tree, and loses the power of repeating it when kept in confinement. I have attentively watched this phænomenon, and have observed that the liquid is given off from the hinder part of the shield. " They feed themselves with the detritus of the decayed wood and do not touch the leaves, at least of those trees which I have carefully examined, and never found a leaf either

cut or eaten, and on which trees they were very common." My own observations would lead me to dissent from the conclusion here come to by M. Bouchard, as I have frequently observed them on young and healthy beech trees which did not exhibit the least appearance of decay, and where they concealed themselves during the daytime in those natural crevices peculiar to the bark of the beech. I have observed them also in moist weather ascending to, or descending from the top branches, to which the foliage was confined. Though found under the moss on the trunks of trees, their being there is only, as I conceive, for the purpose of concealment, not for that of procuring food.

"This slug," continues M. Bouchard, "multiplies very slowly; it lays twenty or thirty eggs under the bark, or in the holes of old trees, between the months of September and December; their eggs are isolated, oval, rounded at the extremity, and hatched toward the twenty-fifth day from their being laid. The young are full-grown toward the end of the first year; they are then from 9 to 10 centimetres* in length, 10 millimetres† in height, 8 to 10 millimetres in breadth, and their foot from 5 to 6 millimetres in width."

I have seldom found this slug elsewhere than on trees, or where there was no moss on the stems, under stones lying near the roots; a singular exception to this, their general habit, occurred to me during the present summer in Connemara, where, in an old ruinous chapel near Renvyle, far apart from any tree, I found this slug crawling about among the tombstones within the walls in considerable numbers.

This species is by no means uncommon in Ireland, and appears to be, as far as my observations extend, widely distributed over the island. I feel confident that when the attention of naturalists is once drawn to the species, it will be found generally throughout the wooded parts of Great Britain and Ireland.

Mr. Thompson of Belfast informs me, on sending him living specimens, that it has occurred to him in the north of Ireland, and he has seen it in numbers on the stems of trees after rain, but has hitherto looked upon it as a variety of *L. flavus*.

Mr. Alder of Newcastle, to whom I sent a drawing of the animal, observes in reply, that "he thinks he has observed a slug very like it in some parts of the country, and which he took for a variety of *L. cinereus*."

The localities in which I have met with it are as follows:—*Queen's county*, Spire Hill Wood and Emo Park:—*Co. Galway*, Monivea Wood, woods near Dunmore, Tuam Palace demesne, at Renvyle in the ruins of a chapel. The Dunmore specimens

* = 0·393 inch. † = 0·039 inch.

were subject to more variety in their markings than I have elsewhere seen them.

* * *Mantle rounded behind, marked with concentric striæ; end of tail keeled; shell flat.*

1. *Limax flavus*, Draparnaud. (Pl. XI. figs. 11, 12.)
   L. variegatus, *Férussac.*

L. "Lutescens, fusco maculatus, tentaculis cæruleis."—*Drap.*

Hab. Cellars and damp ground-floors; sometimes, but rarely, on trees.

This species may be easily distinguished by its azure-blue tentacles, the mantle being always mottled with yellow, the body more or less covered with little oval yellowish spots, and the sides pale yellowish. The yellow spots vary considerably in different individuals, but the figures which I have given represent the usual forms which have occurred to me in Ireland. I have occasionally observed this slug in the hollows of old trees, upon the leaves of which it feeds. This species is not uncommon in Ireland, although nowhere plentiful. It is no doubt the slug which Miss Ball alludes to as finding its way into pantries and eating holes in bread. I have supplied them with bread when kept in confinement, and they eat it voraciously.

* * * *Mantle truncated behind, marked with concentric striæ; end of tail keeled; shell flat.*

1. *Limax agrestis*, Linn. (Pl. XII. f. 13.)
   L. filans (young), *Hoy.*
   Limacellus obliquus (shell), *Turton.* (Pl. X. fig. *d.*)

L. "Albidus maculatus et immaculatus, corpore subrugoso, apertura laterali postica."—*Drap.*

Var. *α.* "Albidus, immaculatus."—*Drap.*
Var. *β.* "Albidus, atomis nigris sparsis."—*Drap.*
Var. *γ.* "Albidus, clypeo flavescenti."—*Drap.*

Hab. Fields and gardens: common.

Of this abundant little species I have noticed all the varieties described by Draparnaud. There is a curious dark variety which has occurred to me not unfrequently; it is of a uniform dark purplish or slate colour, usually found in company with the other varieties.

* * * * *Mantle truncated behind, granulated or shagreened; entire length of back keeled from the shield or mantle; shell convex.*

1. *Limax Sowerbii* (Pl. XII. figs. 14, 15.), Férus. Hist. Moll. t. 8 D. f. 7; Alder, Mag. Zool. and Bot. ii. 105.
   Limax carinatus, *Alder,* Mag. Zool. and Bot. ii. 105; *Leach,* Moll. 73. t. 8. f. 1; *Gray,* Turt. Man. ed. p. 116.

L. "Lutescens fusco-tesseratus, capite granuloso, sulco marginali, carina dorsali succinea, valde notata lateribus pallidis."—*Férussac.*

Hab. Circular Road near Phœnix Park, co. Dublin, R. Ball, Esq.

Specimens of this *Limax* have been obligingly forwarded to me by Mr. Ball of Dublin, as taken by him on the Circular Road in ditches. They agree well with Férussac's description and figures, and also with the diagnostic characters as given by Mr. Gray in his edition of Turton's 'Manual.' "Keeled slug, yellowish tessellated with brown; head and tentacles black; mantle granulous and with a furrow near its margin, the ridge or keel of the back very obvious and of an amber colour; the sides pale; *shell* (Pl. X. fig. *e.*) oval, often thickened, and very convex beneath."

This species is doubtless the *L. carinatus* of Leach. Mr. Alder has separated it from the *L. Sowerbii* of Férussac in his catalogue, but he informs me he did so "merely because they were already recorded species which he had not an opportunity of investigating." Mr. Alder has kindly favoured me with the examination of a shell of the only keeled slug which has occurred to him as found near Bristol, and which I consider to have belonged to a young individual of *L. Sowerbii.*

2. *Limax Gagates,* Drap. t. 9. figs. 1, 2.
Limax Gagates, *Férus.* Hist. Moll. pp. 75 & 76. t. 6. figs. 1, 2.

Limax. "Niger nitidus, corpore striato subrugoso, dorso carinato." —*Drap.*

Var. β. Férussac. "Plumbeus vel griseo-niger."—Pl. XII. figs. 16, 17, 21.

Var. γ. Clarke. Fuscus, lateribus pallidis.—Pl. XII. figs. 18, 19, 20.

Hab. Fields, gardens and meadows, Ireland.

I feel great pleasure in being able to record the occurrence in Ireland of this interesting mollusk, which has hitherto been unknown as a British species.

The Irish specimens are mostly referable to var. β. Férussac. Animal of a fine deep blue-black or lead colour; sides pale grayish; tentacles dark gray; sole of the foot whitish.

The *variety* γ. is not unfrequently found with the above; they are yellowish brown clouded with gray, the keel often narrowly margined with yellow, and the sides of the mantle yellowish.

Within the present month (September) I have taken specimens at Tourmakady Lodge, on the borders of Lough Mask, which approach closer to Draparnaud's description than any I have hitherto observed; they were of a deep black colour, the sides paler, and exhibiting that greenish tinge of which the latter author makes mention.

The *mantle* of this species is truncated behind, granulated or

shagreened, marked with an elevated ridge which circumscribes it and meets in a point over the pulmonary orifice, causing the upper part of the mantle to appear more prominent than the sides.

The *back* is sharply keeled in its entire length from the mantle, the keel projecting above the mantle when the animal is at rest and forming a crenated ridge. The longitudinal sulci or markings of the skin well-defined and divergent toward the tail; the transverse sulci inconspicuous: the intervening spaces, being finely granulated and not very apparent to the naked eye, give to the animal that smooth, shining appearance, which, coupled with its deep colour, has suggested the name of "*Jayet*." A double marginal furrow runs round the edge of the foot, which is very conspicuous when in a state of contraction. The central band of the foot is broader than the side ones.

The *internal shell* (Pl. X. fig. *f.*) is small, of an elongated form, oval, thick, and irregularly convex beneath, with a crystalline appearance. In some of the varieties the shell is often flat beneath and on the top presents a double appearance, or as if a smaller-sized shell were placed on the top and centre of a larger, leaving a broad marginal zone, which is often rufous coloured toward the apex (Pl. X. fig. *g.*). In some specimens the crystalline structure of the convex side assumes the appearance of the facets of crystals.

In the Queen's county, where I first observed this species, var. γ. is of by far the most common occurrence, which led me at first to believe them not to be identical with *L. Gagates* of Draparnaud, and consequently when I first noticed it under the name of "*L. carinatus*" (Ann. and Mag. of Nat. Hist. No. 36. p. 205), I was unable to speak with any degree of confidence as to the species. However, I have since obtained, abundantly, in the neighbourhood of Tuam and also near Lough Mask, the specimens from which the present description and some of the figures (figs. 16 and 17.) are taken, which so well agree with Draparnaud's and Férussac's diagnostic characters. And I have the further satisfaction of being fortified in my opinion by that of Mr. Thompson, to whom I sent specimens for examination, who, with his usual discrimination and caution, has pronounced them to be identical with *L. Gagates* of Draparnaud. Férussac, in describing his var. β, "Plumbeus vel griseo-niger," remarks: "Nous avons observé que la variété qui nous a été envoyée le 24 Avril de la Rochelle par M. D'Orbigny, et qui à la couleur près nous a offert tous les caractères du *L. Gagates* de Draparnaud, ce qui nous porte à la considérer comme une simple variété de cette espèce."

This *Limax* is found rather abundantly in gardens around

Tuam, where it frequents the thickest herbage and tufted plants. It proved very destructive this year, along with *L. agrestis* and *Arion hortensis,* to crops of young garden plants, especially onions, but it is by no means so plentiful a species as the two last named.

In conclusion I shall point out a few of the more striking peculiarities by which it may be distinguished from *Limax Sowerbii,* the only British species which will bear comparison with it. In the shape of the shield and in the continuous dorsal ridge it is very similar; the latter however is much sharper in *L. Gagates,* and forms a much more prominent keel when the animal is at rest. The tissue of the skin, instead of presenting the tessellated and rugose appearance of *L. Sowerbii,* is disposed in longitudinal furrows branching off into veins, not unlike the nervures of a leaf. The *tentacles* are *gray* instead of *black* as in *L. Sowerbii,* and the entire animal is of a more uniform colour.

Mr. Alder of Newcastle informs me that the internal shell, of which I sent him specimens, differs from any he had before.

The localities in which I have taken it are as follows:—

La Bergerie, Queen's co.; Tuam Palace Gardens, co. Galway; Tourmakady Lodge, near Ballinrobe, co. Mayo: in this last-mentioned locality they were very characteristic specimens and particularly abundant.

Note.—*Limax brunneus,* Drap.

This species has not as yet occurred to me in Ireland, nor am I at present aware of its being noticed by others in this country.

M. Bouchard Chantreux thinks that the young of *Limax arboreus* is "what Hoy, Shaw and Latham have named '*Limax filans,*' as he has seen them descending from branch to branch by means of a mucous thread which they spin."

This conclusion is evidently come to on the supposition that the property of so spinning is confined to one species; whereas it may be seen from my observations on this point, 'Ann. and Mag. of Nat. Hist.' Vol. vi. p. 206, that many other species are capable of doing so; in fact, the young of all our British species have the power of making use of this mode of progression until they attain to that size when the weight of their bodies becomes too great for such a fragile thread. I have frequently seen some of the larger species make the attempt when compelled to do so, but invariably fall helplessly to the ground the moment the tail approached near the edge of the leaf or branch from which they had allowed themselves to slide.

I have succeeded in making the following species spin a thread of slime:—

Limax arboreus, young only; *L. Sowerbii,* young; *L. agrestis,*

both young and adults; *Arion hortensis,* young and adults; *Arion ater,* young only. From this it may be seen that the genus *Arion* as well as *Limax* possesses the property.—B. J. C.

Tuam, Sept. 30, 1843.

EXPLANATION OF THE PLATES.

Plate X.

Fig. 1. *Limax maximus,* var. γ. Drap.
— 2. Do. do. Nilsson's "Cinereo-niger."
— 3. Tooth or cutting plate of *L. maximus,* magnified and nat. size.
— *a*. Internal shell of *L. maximus.*
— *b*. Do. do. *L. arboreus.*
— *c*. Do. do. *L. flavus.*
— *d*. Do. do. *L. agrestis.*
— *e*. Do. do. *L. Sowerbii.*
— *f*. Do. do. *L. Gagates.*
— *g*. Do. do. variety *L. Gagates.*

Plate XI.

Fig. 4. *Limax arboreus.*
— 5. Do. do. resting position.
— 6. *L. arboreus,* variety.
— 7. Do. do. resting position.
— 8. *L. arboreus,* variety.
— 9, 10. *L. arboreus,* young.
— 11. *L. flavus.*
— 12. Do. do. back view.

Plate XII.

Fig. 13. *Limax agrestis.*
— 14. *L. Sowerbii.*
— 15. Do. do. resting position.
— 16. *L. Gagates.*
— 17. Do. do.
— 18. Do. do. variety.
— 19, 20. Do. do. resting.
— 21. Do. do. var. β. Férussac.
— 22. *L. Gagates,* young.

XLIII.—*Descriptions of apparently new species and varieties of Insects and other Annulosa, principally from the collection in the British Museum.* By Adam White, M.E.SS. Lond. and Paris, Assistant Zoological Department, British Museum.

INSECTA.

Coleoptera.

Buprestidæ.

1. *Chrysochroa* (*Catoxantha,* Dej.) *opulenta* var. *purpurea,* White. C. purpurea, elytris post mediam flava fascia transversa, meso- et meta-thoracibus subtus purpureo et viridi micantibus. Long. unc. $1\frac{3}{4}$—2.

Hab. Philippine Islands (Cuming): Brit. Mus.

This differs from the *Chrysochroa opulenta,* Gory, in the meso-

and meta-thoraces beneath being of a metallic purple like the under-side of the prothorax, and in the segments of the abdomen having a black mark on each side at the base; the upper surface is purple instead of green; it may however eventually be found to be merely a local variety of the *opulenta*. I have only seen two specimens.

2. *Chrysochroa prælonga*, White. C. cærulescenti-viridis, elongata, elytris subsulcatis, apice rude serratis, thorace sulco mediano cæruleo. Long. unc. 1, lin. 10—11.

Hab. Philippine Islands (Cuming): Brit. Mus.

A species near *C. ignita* and *fulminans*; it is of a bright metallic green, changing to blue in some lights, especially on the margins of the elytra. Thorax grooved down the middle, the grooved furrow and (concealed) scutellum of a fine deep blue. Elytra much elongated, strongly serrated at the apex and coppery. Abdomen beneath coppery, the last two segments more intensely so.

3. *Chrysochroa sublineata*, White. C. viridis, subdepressa, elytris margine laterali cupreo, basi lævibus ante mediam, lineis tribus subelevatis longitudinalibus, basi obsoletis. Long. unc. 1, lin. 5.

Hab. N. Bengal. Brit. Mus.

This may prove a variety of *C. unidentata*. Each of the elytra has a short spine at the end, and three longitudinal raised lines not reaching the margin and obsolete towards the base, which is very smooth; the elytra are minutely punctured; the lateral margins are of a bright coppery hue; the thorax is roughly and coarsely punctured, and has a longitudinal, smooth, reddish dorsal line not reaching the posterior margin.

4. *Chrysochroa ocellata* (var. *ephippigera*), White. Long. unc. 1, lin. 6.

In the British Museum there is a much-injured specimen of this variety, which might probably be regarded as a species by Messrs. Laporte and Gory. It is not far removed from the *C. Edvardsii*, Hope, 'Linn. Trans.' vol. xix. The under-side is far more coppery than in two specimens of *ocellata* in the Museum collection, the deep purplish-blue line down the middle of the thorax is wider, and the margins are of a very deep coppery red, which colour occupies all the rest of the prothoracic back, excepting a narrow line of green which separates the blue from the coppery, and a narrow margin of green in front; the coppery red patches at the base and apex of each elytron are larger also and more intense; the yellow patch runs right across both elytra, and is pointed behind, very obtusely angled in front, the edge of the yellow being separated from the lateral margin by a narrow

bluish-black line; this yellow "saddle" is margined with black, especially in front and behind; the tibiæ are greenish.

5. *Stigmodera funerea*, White. S. subcupraceo-nigra, elytris fasciis 4, ochraceo-flavis, lateribus flavo connexo jugatis. Long. unc. 1, lin. 3.

Hab. Australia, King Geo. Sound (Capt. Geo. Grey). Brit. Mus.

This species comes close to *S. variabilis* and *Kingii*: it has striated deep black elytra, with four transverse ochrey yellow bands connected in pairs at the sides. The thorax, legs, and under parts are of a uniform deep shining black; the thorax below is covered with cinereous hairs.

6. *Stigmodera conspicillata*, White. S. testacea fasciis viridibus, thorace convexo, antice angustato viridi macula laterali flavescente. Long. lin. 11—15.

Hab. Australia (Swan River). Brit. Mus.: Dr. Richardson, F.R.S.

Elytra striated, of a testaceous yellow colour, with two violet-green transverse bands, the anterior not reaching the outer margin, second reaching the outer margin, and connected by a narrow line of the same colour with a large violet-green spot on the apex; the base is narrowly margined with green. Thorax very convex and small, narrowed in front, above green, with a yellowish spot on each side; sides beneath yellow, the yellow reaching the margin above in front and connected behind with the yellow spot. Body beneath yellow. Head, scutellum, legs, segments of abdomen behind and at the base edged with green, which is macular on the sides.

In one specimen (a smaller variety) the elytra are yellow, and have only the narrow green margin at the base and the large violet-blue spot on the apex.

Lepidoptera.

Bombycidæ.

7. *Saturnia Helena*, White, n. sp. S. ochraceo-fulva; alis superis apice subrosaceis, macula nigra postica, alis ambobus linea transversa (post mediam currente) triseriatim colorata, ocello paululum fenestrato ochraceo-rufo, lunula subcærulea nigroque annulato; corpore subtus, capite, antennis pedibusque subaurantiacis, tarsis nigro-annulatis. Exp. alar. ♀ unc. 6—6¼; ♂ 5½.

Hab. Australia. Brit. Mus. Hardw. Bequest and J. Hunter, Esq.

In shape and general appearance not far removed from the *Saturnia Paphia* (L.), *Mylitta* (Drury), the well-known Tusseh silk-moth, whose history is given by Dr. Roxburgh in the 'Linnæan Transactions.'

8. *Saturnia Janetta*, White, n. sp. S. ochraceo-brunnea; alis superis linea subbasali W notata; macula parva fenestrata brunneo cir-

cumdata prope mediam, linea transversa brunnescenti-undulata fasciaque maculari indistincta, maculis subcinereis postice obscurioribus, alis inferis lineis 2 transversis undulatis brunnescentibus, fasciaque maculari subcinerea; corpore ochraceo-aurantiaco. Exp. alar. unc. $4\frac{1}{2}$ (♂).

Hab. Australia? Brit. Mus.

The two species of moths, described above, are alluded to in a paper laid before the Entomological Society of London, Oct. 6, 1843, containing remarks on the fenestration in the wings of *Saturnia*, prefatory to a notice of the remarkably grooved and tense undulating-surfaced tympanum on the upper wing of the genus *Hecatesia*. In the *Saturnia* division of *Bombycidæ*, these fenestræ, when they occur, seem to be common to both sexes, and appear to be merely ornamental; they are sometimes quite obsolete; in *Hecatesia* they are limited, I believe, to one sex, and, as was remarked in the appendix to Capt. Grey's 'Travels,' the individuals possessing them make a remarkable noise, as was told me by that excellent observer Capt. George Grey, now in S. Australia. I wish that some competent physiologist would thoroughly examine this beautiful tympanoid membrane, and explain how the noise *could* be produced by the insect, and whether or not the fenestra has any connexion with the noise.

Crustacea.

Decapoda.

9. *Atelecyclus spinosulus*, White. Carapace as long as broad, with the surface granulated and rather uneven. In front, between the orbits, the carapace projects, but not so far as the end of the eye; the projecting part ends in a strong tooth; the sides of the carapace are spinulose and have five indistinct teeth. The hands are externally rough with spines, and have on the upper edge a series of larger teeth and a row of longish hairs. Colour above red spotted with white, beneath entirely white.

Hab. Falkland Islands (W. E. Wright, Esq.). Brit. Mus.

This species comes near the *Atelecyclus Chilensis* of Edwards in marks and general appearance, but in the form of the carapace resembles *A. heterodon* of Leach.

Isopoda.

10. *Sphæroma gigas* (var. *lanceolata*), White. Body smooth, last joint of the abdomen considerably arched above, and having near the base a slight elevation grooved in the middle; the last joint is also in most of the specimens considerably pointed, and extends very slightly beyond the extremity of the inner plate of the last false legs; the outer plate of these appendices is narrow and lanceolate; both of the plates are minutely punctured with black.

Hab. Falkland Islands (W. E. Wright, Esq.); Salvador Bay, under stones, very common. Brit. Mus.

There are specimens in the British Museum collection varying from three-quarters of an inch to a whole inch in length. This species or variety comes very near the *S. gigas*, Leach, 'Edw. Crust.' iii. p. 205, from which it principally differs in the more elongated and narrower outer plate, and in the grooved elevation at the base of the more arched last joint of the abdomen.

11. *Serolis paradoxa* (Fabr. spec.), Leach.

Mr. Wright informed me, on his return from the Falkland Islands, that this singular flat crustaceous animal is very common in the Carnash, Berkley Sound, Falkland Islands; it is found in shallow places with a bottom of light sand and mud, among which it burrows, and in which, when disturbed, it buries itself very rapidly. He assured me he had seen specimens at least six inches long. This species was first found by Sir Joseph Banks on one of Cook's voyages, off the coast of Tierra del Fuego. We have one specimen in the Museum *labelled* as coming from Senegal, the others were given by Mr. Wright from the locality above mentioned.

XLIV.—*On the British* Diatomaceæ. By John Ralfs, Esq., M.R.C.S., Penzance*.

[Continued from p. 276.]

[With a Plate.]

Meloseira, *Ag.* (Gallionella, *Eh.*)

Filaments cylindrical, siliceous, jointed, fragile; one or two lines passing round each frustule near its centre.

This genus in its cylindrical filaments differs from the other *Cymbelleæ*, and thus connects them with the *Conferveæ*; but it agrees with them in being generally of a brown or yellowish colour when recent, and especially in its siliceous filaments and in the presence of striæ; characters which sufficiently point out the propriety of its present situation amongst the *Diatomaceæ*.

The filaments have no proper margins marked by distinct characters as in the other genera of the *Cymbelleæ*; and the striæ when present on the junction-surfaces are not transverse but radiated.

The cylindrical form of the filaments, and also the other differences just mentioned, compel me, in describing this genus, to use the terms length and breadth in the sense in which they are applied to a Conferva, and consequently in one the reverse of that which they have in respect of the other genera of this family.

This genus may be divided into two sections, which differ in several respects.

* Read before the Botanical Society of Edinburgh.

In the first section, the species belonging to which are generally marine, the ends of the frustules are convex, and as there are no distinct junction-surfaces, a moniliform appearance is produced. The central line is more strongly marked in this than in the other section, and seems to divide the frustule into two equal portions. It becomes broader and then double, and at length an intermediate growth separates the two halves of the frustule, which during this process do not increase in size; but when the intermediate space is equal to the diameter of the original frustule, two new frustules are formed by the addition of two hemispheres on the inner sides of the separated portions. The outer siliceous covering still remaining, the frustules are connected in pairs, and appear like two globules within a joint, as they are characterized by Harvey in *M. nummuloides,* and by Carmichael in *M. globifera.* The above description belongs more particularly to *M. nummuloides,* but the process in the other species in the first section is the same. Mr. Dalrymple first called my attention to this singular mode of growth. In a letter he remarks on *M. nummuloides,* that "the joints of the *Meloseira* are not only united end to end, but sometimes two corpuscles are included within the same boundary-line, while others are disjointed as it were and merely united end to end. This I believe arises from the mode of reproduction, and that each corpuscle is capable of dividing into two bodies within its original siliceous shell." A series of changes nearly similar in *Isthmia* has been already described*.

All the species in the other section are found in fresh water. The frustules are not united in pairs, their junction-surfaces are distinct and nearly flat, and their central lines are probably furrows; hence whatever parts of these lines occupy the margin of the field of view, as the filaments are turned round, they all appear like puncta.

M. lentigera, Harv., evidently belongs to the first section, but I have seen no specimen, and cannot refer it to any species with which I am acquainted.

Through the kindness of Mr. W. Thompson I have been enabled to examine a specimen of "*Meloseira Thompsoni*" marked by Mr. Harvey himself. This beautiful and interesting plant appears to me to be a species of *Sphæroplea*; at any rate it should be removed from *Meloseira,* since the filaments are not siliceous.

Mr. Hassall has favoured me with the following observations on this plant:—"I can scarcely believe that *Meloseira Thompsoni* is really a *Meloseira,* for it does not appear to exhibit even one of the characters of that genus. The filaments in *M. Thompsoni* are equal, while in the species with which I am acquainted of true

* This similarity has also been observed by Mr. Berkeley.

Meloseiræ they are attenuated; the cells too are not divided as in *Meloseira* by lines, either single or double.

"The above I think are some of the principal differences between the *Conferva* which has received Mr. Thompson's name and the *Meloseiræ*, and these are in my opinion too considerable to admit of its holding a place with these. Would it not be more correct to place it with the species of the genus *Lyngbya*?"

* *Filaments moniliform; frustules united in pairs.*

1. *M. nummuloides*, Ag. Frustules spherical, having a line near each end, but less strongly marked than the central one. Ag. Syst. p. 8; Consp. Diatom. p. 65; Kutz. in Linnæa 1833, p. 70. fig. 72; Grev. in Hook. Br. Fl. vol. ii. p. 401; Harv. Br. Alg. p. 195. *M. discigera*, Ag. Syst. p. 8; Berk. Br. Alg. p. 31. t. 11. fig. 2! *M. Borreri*, Wyatt, Alg. Damn. no. 232! *Conf. nummuloides*, Dill. p. 45. t. B. *Conf. moniliformis*, Jurg. Dec. 1. no. 7! *Gallionella nummuloides*, Eh. Die Infus. p. 167. t. 21. fig. 1; Pritch. Infus. p. 199. *G. moniliformis*, Bailey, American Bacil. part 2. p. 4. pl. 11. fig. 3.

In the sea or in brackish water. Margate, *Rev. M. J. Berkeley*; river Dart, *Mrs. Wyatt*; salt marshes near Larne, co. Antrim, and near Dublin, *Mr. D. Moore*. Penzance; Bangor, N. Wales.

It is brown when recent and becomes green in drying. Filaments free, slender, moniliform, constricted between each pair of the frustules. Frustules globular, united in pairs, and each divided into hemispheres by a central line, and crossed by a fainter line at each end.

Plate IX. fig. 1. *Meloseira nummuloides*; *a*, frustules deprived of colouring matter; *b*, different stages, showing the mode of growth; *c*, dotted lines, marking new hemispheres; *d*, new hemispheres just formed.

2. *M. Borreri*, Grev. Frustules rather longer than broad, cylindrical, rounded at the ends, with a central, strongly marked line. Grev. in Hook. Br. Fl. vol. ii. p. 401; Harv. Br. Alg. p. 196. *Conf. nummuloides*, Eng. Bot. t. 2287! (bad).

On marine algæ. Shoreham Harbour, *Mr. Borrer*; Chichester Creek, *Mr. Jenner*. Penmaen Pool near Dolgelley.

This species much resembles the preceding, but is I believe distinct. The filaments are stouter; the frustules rather longer than broad, cylindrical, with their ends less convex, and marked only with a central line. Sometimes the ends at their junction are compressed, and then the frustules appear angular. In this character it seems to approach the *M. moniliformis*; the ends however of the frustules in that species are figured by Ehrenberg as truncated cones—more convex therefore than those of *M. nummuloides*, and consequently still more so than those of this plant.

Plate IX. fig. 2. *Meloseira Borreri*.

3. *M. globifera*, Harv. Frustules nearly globular, with numerous

striæ, which are most evident on the siliceous covering. Harv. Br. Alg. p. 196. *Rosaria globifera*, Carm. in Hook. Br. Fl. vol. ii. p. 372.

On marine algæ. Torquay, *Mrs. Griffiths*; Hastings, *Mr. Jenner*; Ardmore, *Miss Ball* (according to a specimen from Mr. W. Thompson). Ilfracombe.

Filaments affixed by a short stipes; frustules nearly globular, united in pairs, each with a strongly marked central line. Numerous close striæ pass round the filaments, and are most conspicuous on the siliceous remains of the old frustule, by which the new ones are connected in pairs.

The specimens which I have seen are apparently defective, as in all only one pair of frustules is attached to the stipes.

Ehrenberg represents the frustules of his *Gallionella lineata* as longer than broad, cylindrical, with a quadrangular appearance, whereas in this species they are nearly globular; otherwise I might have supposed he intended to describe this species.

Some specimens I have received from Mr. Jenner have their frustules generally longer than broad, but in other respects agree with the above description.

I have received from M. Montagne a *Meloseira* (*M. hormoidea*, Montag.) gathered in Cayenne, which appears to me to be identical with this species, and Mr. Berkeley is of the same opinion. As however the filaments are composed of several frustules, it is in a more perfect state than any British specimen which I have examined.

Plate IX. fig. 3. *Meloseira globifera*.

** *Filaments not moniliform; frustules cylindrical.*

4. *M. arenaria*, Moore MS. Filaments stout; frustules broader than long, with a single central line; junction-surfaces closely united, striated. *Gallionella varians*, Eh. Die Infus. p. 167. (in part) t. 21. fig. 2; Pritch. Infus. p. 199. fig. 131° (junction-surface).

In fresh water. On a wet bank near Larne, co. Antrim, *Mr. D. Moore*; inner extremity of the Giant's Causeway, *Mr. W. Thompson*; very sparingly in a freshwater stream near Shoreham, Kent, *Mr. Jenner*.

Brownish when recent, pale green when dried.

Filaments much stouter than any other species in this genus, distinct to the naked eye, when rubbed between the fingers feeling rough like grains of sand, whence its specific name.

Frustules closely united, broader than long, discoid, appearing slightly granulated with a broadish smooth central line; their junction appears like a dentated suture; the junction-surfaces are striated in a radiating manner; the striæ are most evident at the margin, and sometimes very faintly marked in the centre.

In drawing up the above description I have availed myself of Mr. Moore's notes.

Ehrenberg appears to have confounded this very beautiful and distinct species with *Meloseira varians,* which I am the more surprised at, because he has given very good figures of both plants.

The characters by which this species is distinguished from *Meloseira varians* have been so clearly pointed out by Mr. Dalrymple, that I shall use an extract from his letter instead of making any observations of my own.

"*Meloseira varians,* Ag., is as clearly *Gallionella varians* of Ehrenberg, t. 10. fig. 4, as *Meloseira arenaria,* Moore, is *Gall. varians* of t. 21. fig. 2. Still no tyro in natural history could presume that the two were the same species. The characteristic difference exists in the well-marked feature of the striæ at the junction-lines of the corpuscles, and which, combined with their discoid form, bears a strong resemblance to the *milled heads* of many of the adjusting screws of our microscope. Added to this is the appearance of radiating lines seen when the flat surface of the disc is viewed."

Plate IX. fig. 4. *Meloseira arenaria.*

5. *M. varians,* Ag. Frustules once and a half to twice as long as broad, with a single central line, the ends slightly rounded; junction-surfaces without striæ. Ag. Consp. Diatom. p. 64!; Kutz. in Linnæa 1833, p. 71. fig. 69; Harv. Br. Alg. p. 195! *M. lineata,* Ag. Syst. p. 8; Harv. Br. Alg. p. 195! *Gallionella varians,* Eh. Die Infus. t. 10. fig. 4. *G. aurichalcea,* Bailey, Amer. Bacil. part 2. pl. 2. fig. 4 *c.* *Conf. lineata,* Dill. p. 44. t. B; Jurg. Dec. 5. no. 10! *Conf. hyemalis,* Jurg. Dec. 17. no. 6! *Vesiculifera composita,* Hassall in Annals of Nat. Hist. vol. x. p. 394!

In freshwater rivulets and ditches. King's Cliff, Northamptonshire, *Rev. M. J. Berkeley*; frequent in Sussex, *Mr. Borrer*; Lewes, *Mr. Jenner*; Cheshunt, *Mr. Hassall*; Shrewsbury, *Mr. Leighton*; Oswestry, *Rev. T. Salwey.*—Aberdeen, *Dr. Dickie*; Stevenston, Ayrshire, *Rev. D. Landsborough.*—Antrim and Limerick, *Mr. W. H. Harvey*; Ballycastle and near Belfast, *Mr. D. Moore.* Tavistock, Ilfracombe, Penzance, Dolgelley, Caernarvon.

It is brownish when recent and becomes green in drying *.

Filaments very slender, but varying much in thickness, fragile; joints from once and a half to twice as long as broad, with a single central stria, the ends rounded so that the joints are not so closely united as in *M. arenaria* and *M. orichalcea.*

* In a stream below Penmaen Pool near Dolgelley, and within the influence of the tides, I have gathered a tufted state of this species of a bluish colour, not unlike the iridescent tints of *Cystoseira ericoides.* It was growing with *Ectocarpus littoralis.* I have also for several years observed it in the same state in a cave by the sea-side at Penzance: in both instances it afterwards became brownish and finally green.

Not unfrequently this species has the joints here and there dilated into a globular form as described by Kutzing; in this state it much resembles a species of *Vesiculifera*, Hassall; and indeed Mr. Hassall, whose researches have so much extended our knowledge of the freshwater Algæ, was induced by this resemblance to refer it to a subdivision of that genus, in one of his valuable and interesting papers on the British freshwater Confervæ; but since his paper was published he has agreed with me in opinion that his *V. composita* is undoubtedly the *Meloseira varians* of Agardh, and not a species of *Vesiculifera*. When the joints are thus dilated, the central furrow gives the appearance of two joints combining in the formation of the inflated cells.

PLATE IX. fig. 5. *Meloseira varians.*

6. *M. orichalcea*, Kutz. Filaments slender; frustules two to three times longer than broad, marked with two central lines; junction-surfaces striated, closely united. Kutz. in Linnæa 1833, p. 71. fig. 68. *Gallionella aurichalcea*, Eh. Die Infus. p. 168. t. 10. fig. 6; Pritch. Infus. p. 200; Bailey, Amer. Bacil. part 2. p. 5. pl. 2. fig. 4 *b*.

In freshwater ditches and slow streams. Cheshunt, *Mr. Hassall*; Stevenston, Ayrshire, *Rev. D. Landsborough*; Dolgelley.

Brownish when recent; it becomes paler in drying.

The filaments are finer than in *M. varians*; joints two to three times longer than broad, with two lines near the centre; ends closely united in the same manner as in *M. arenaria*, but the dentated appearance of the ends of the striæ is less evident; junction-surfaces flat with radiated striæ, which are often very obscure in the centre, but generally plainly developed round the margin.

This species is likely to be mistaken for *M. varians*; but its filaments are more slender and more uniform in size, the joints are longer, more closely united, and especially it differs in having two central lines and striated junction-surfaces, and in not turning green in drying.

Kutzing figures this species with joints occasionally enlarged in the same manner as in *M. varians*.

Mr. Hassall first detected it in this country.

PLATE IX. fig. 6. *Meloseira orichalcea.*

**** Filaments very slender; joints obscure.*

7. *M. ochracea*. Frustules very slender, convex at each end, ovate, not striated, ferruginous; filaments often connected together in a subramose manner. *Gallionella ferruginea*, Eh. Die Infus. p. 169. t. 10. fig. 8. and t. 21. fig. 3; Pritch. Infus. p. 200. figs. 129, 130. *Conferva ochracea*, Dill. t. 62! *Oscillatoria ochracea*, Grev. Fl. Edin. p. 304; Harv. Br. Alg. p. 167.

Pools and slow running streams, especially in boggy soils.

This plant occurs in delicate ochraceous or ferruginous masses, falling into powder on the slightest touch. The filaments are so slender, and the joints so obscure, that I have been unable to determine the form of the frustules, and have therefore taken the specific character from Ehrenberg; I am also unable to ascertain whether the joints are marked by any central line. Having received from Mr. Dillwyn a specimen of his *Conferva ochracea*, which I am able confidently to refer to this species, I have restored the original specific name. Ehrenberg is no doubt correct in placing the plant in this genus, as the filaments are siliceous and cylindrical.

When submitted to a red heat it acquires a reddish tinge, which circumstance, together with the colour and slender filaments, will easily distinguish it from all the other species.

Analysis.

1.	Joints very obscure, the central line apparently wanting,	*ochracea.*
	Joints and central line distinct	2
2.	Filaments moniliform; frustules connected in pairs......	3
	Filaments not moniliform; frustules not connected in pairs	5
3.	Frustules and connecting portion closely striated	*globifera.*
	Frustules with one to three lines, not striated	4
4.	Frustules globular	*nummuloides.*
	Frustules longer than broad, cylindrical, with the ends rounded	*Borreri.*
5.	Junction-surfaces not striated	*varians.*
	Junction-surfaces striated	6
6.	Frustules broader than long	*arenaria.*
	Frustules two or three times longer than broad	*orichalcea.*

XLV.—*Information respecting Scientific Travellers.*

We take much pleasure in announcing that three enterprising botanists are now engaged in exploring the most interesting portions of the *far West*, and that their collections of dried plants will be offered to subscribers, in sets, as they come to hand. Two of these collectors, Mr. Charles A. Geyer (well known as the botanist of Mr. Nicollet's official north-western expedition), and Mr. Lüders, who are for the present attached to Sir Wm. Stewart's party, have by this time reached the Rocky Mountains. The particular field of Mr. Geyer's operations, and the extent of his journey, were undecided at the time of his departure from St. Louis. Mr. Lüders expects to spend the next winter, and perhaps the ensuing summer, at a station of some Roman Catholic missionaries on the upper waters of Lewis and Clarke's or Great Snake River. These botanists being well acquainted with the vegetation of the general Valley of the Mississippi and of the lower Missouri, will doubtless avoid the common and better known plants of this region; and thus their collections may be expected to prove unusually choice and valuable.

The third collector, Dr. Lindheimer, a very assiduous botanist, intends to devote a few years to the exploration of Texas; and he pledges himself to exclude from his sets all the common plants of the south-western United States.

These several collections will be assorted and distributed, and for the most part ticketed, by Dr. Engelmann of St. Louis; assisted, as far as need be, by the authors of the 'Flora of North America,' who promise to determine the plants, so far at least as they belong to families published in that work; and for the information of subscribers, particular notices of the *centuria* offered for sale will probably appear in this Journal* as they come to hand. The number of sets being limited, earlier subscribers will receive a preference. The three explorers are entirely independent of each other, and their collections are to be separately subscribed for.

The price of the Rocky Mountain collections of Geyer or of Lüders is fixed at ten dollars (or two guineas) per hundred; that of Dr. Lindheimer's Texan collections at eight dollars (or 1*l*. 13*s*. 6*d*. sterling) per hundred—payable on delivery of the sets at St. Louis, Missouri, by Dr. George Engelmann; at New York by Wiley and Putnam, 161 Broadway, and Stationers' Hall Court, London; and Prof. A. Gray of Harvard University, Cambridge, Massachusetts, to either of whom subscribers may address themselves (post paid) by mail. The additional expense of transportation, doubtless trifling in amount, will be charged upon the sets deliverable in London.

The writer of this notice cheerfully states that the dried specimens made by these botanists which have fallen under his observation are well selected, very complete, and finely prepared; and he cordially joins Dr. Engelmann in recommending the enterprise to the patronage of botanists.

For the purpose of obtaining some immediate pecuniary aid in the prosecution of his present arduous undertaking, Mr. Geyer also offers for sale (through the parties above mentioned) a selection from his collections of the last year in Illinois and Missouri, consisting of twenty sets of one hundred and fifty species of plants, which are offered at six dollars per set.

BIBLIOGRAPHICAL NOTICES.

A Catalogue of British Fossils; comprising all the genera and species hitherto described, with references to their Geological Distribution and to the Localities in which they have been found. By John Morris. London, Van Voorst, 1843.

Naturalists of all classes will thank Mr. Morris for this most valuable volume, which, apparently a list of names, is in reality a summing-up of the state of our knowledge of British organic remains at the present time, and being such, becomes the starting-point of future research. It is no mere compilation, but the result of a critical examination of the characters, synonyms, descriptions, and published representations of all the species of animals and plants hitherto recorded

* Silliman's American Journal, from which this notice has been taken. —Ed. *Ann. Nat. Hist.*

as found fossil in the strata of Great Britain, with the addition of many, which though described in continental works, have hitherto been unnoticed at home. The generic relations of fossils have evidently been more carefully inquired into in the construction of this catalogue than is usual in geological writings, and the author has brought a knowledge of living beings to bear on his fossil lore, without which the latter would be, as it in many cases is, comparatively useless.

The volume commences with a catalogue of plants. Those who are familiar with Mr. Morris's former writings on fossil vegetables will place implicit confidence in this chapter, and will see by the numerous references to continental authors how very carefully it has been worked out. The Infusoria follow, of which twenty-one species are recorded; doubtless many more will be presently added by our microscopists to our fossil fauna. Next is a list of Amorphozoa arranged under eighteen genera. Of Zoophyta there is a very extensive list and many additions from foreign sources. The names of many new species from the Crag are here given, descriptions of which we hope Mr. Searles Wood, who has done so much to elucidate that most interesting deposit, will speedily publish. A long list of Echinodermata follows, to which by and by many more will be added, at present lying undescribed in private and public cabinets. Then come seven genera and ten species of anomalous organic remains which Mr. Morris assembles under the head of "*Incertæ sedis.*" The list of Foraminifera well shows the original character of the work, seeing that whilst the total number of previously recorded British fossils of this interesting tribe was only twelve, the number here enumerated is no less than eighty-two! Of Annelides, Crustacea, Mollusca and Vertebrata the catalogues are most extensive, and the amount of new and valuable matter added too great to give any account of here.

The Geological Society has twice awarded the Wollaston Fund to aid Mr. Morris in preparing this catalogue, and has thereby stamped a public sanction on it. A more useful undertaking it could not have patronized, and the result is a volume quite indispensable to zoologist, botanist and geologist.

Preparing for Publication.

The fourth Fasciculus of Mr. Berkeley's Fungi will appear in December. The species included in it are as follows:—

Thelephora caryophyllæa, *P.*
———— laciniata, *P.*
———— cristata, *Fr.*
———— anthocephala, *Fr.*
———— mollissima, *P.*
———— lævis, *P.*
———— rubiginosa, *Schrad.*
———— tabacina, *Fr.*
———— corrugata, *Fr.* var.
———— lactea, *Fr.*
———— miniata, *Berk.*
Sphæria rubella, *P.*
Sphæria pulicaris, *Fr.*
Mitrula cucullata, *Fr.*
Leotia lubrica, *P.*
Geoglossum difforme, *Fr.*
Mitrula spathulata, *Fr.*
Nidularia campanulata, *Sibth.*
———— striata, *Bull.*
Peziza anomala, *P.*
—— calycina, *Schum.*
Fusarium lateritium, *Nees.*
Dothidea colliculosa, *Berk.*
(Æcidii cancellati, stat. imp.)

Helvella crispa, *Fr.*
——— lacunosa, *Afz.*
——— elastica, *Bull.*
Sphæria herbarum, *P.* minor.
——— Bombarda, *Batsch.*
Erysiphe communis, *Schlecht.*
m. Carduacearum.
Acrospermum compressum, *Tode.*
Peziza rhabarbarina, *Berk.*
Aspergillus aurantiacus, *Berk.*
Bulgaria sarcoides, *Fr.*
Peziza versiformis, *P.*
Geaster rufescens, *P.* minor.
Sclerotium Cepæ, *Lib.*
Sphæria corniformis, *Fr.*
Mitrula paludosa, *Fr.*
Elaphomyces granulatus, *Fr.*
Cantharellus sinuosus, *Fr. b.*
Peziza æruginosa, *Fr.*
Dothidea pyrenophora, *Fr.*
Sphæria Racodium, *P.*
Hymenogaster citrinus, *Vitt.*
Melanogaster Broomeianus, *Berk.*
Peziza fusca, *Fr.*
Perisporium princeps, *Berk.*
Sphæria complanata, *Tode*, minor.
(non diversa a num. 267.)
Phacidium Patella, *Fr.*
Sphæria Doliolum, *P.*
Næmatelia encephala, *Fr.*
Perichæna strobilina, *Fr.*
Illosporium carneum, *Fr.*
Polyporus undatus, *P.*
Oidium fulvum, *Lk.*
Sphæria xanthostroma, *Mont.*
Clavaria uncialis, *Grev.*
Thelephora corrugata, *Fr.*
Grandinia granulosa, *Fr.*
Sphæria quaternata, *P.*
——— canescens, *P.*
Hydnobolites Tulasnei, *Berk.*
Tuber nitidum, *Vitt.*
Hymenogaster populetorum, *Tul.*
————— lilacinus, *Tul.*
Elaphomyces muricatus, *Fr.*
Cryptosporium Caricis, *Corda.*
Stictis hysterioides, *Desm.*
Uredo Colchici, *Lib.*
sub Sporisorio.
Camptoum curvatum, *Lk.*
Arthrinium puccinioides, *Kze.*
Coryneum Kunzei, *Cord.*
Erysiphe communis, *Schlecht.*
Potentillarum.
Asteroma Rosæ, *Lib.*
Puccinia Saniculæ, *Grev.*
Depazea Ribicola, *Fr.*
Æcidium Epilobii, *Dec.*
———— Thesii, *Desv.*
Puccinia Circææ, *P.*
Uredo Symphyti, *Dec.*
Fusisporium album, *Desm.*
Æcidium compositarum, *Mart.*
Tussilaginis.
Septoria Leguminum, *Desm.*
b. Pisorum.
Sphæria Rhytismoides, *Bab.*
Melanospora cirrhata, *Berk.*
Excipula graminum, *Corda.*
Bactridium flavum, *Kze.*
Xenodochus paradoxus, *Schlecht.*
Puccinia Umbilici, *Guép.*
Sphæria Ostruthii, *Fr.*
Botrytis parasitica, *P.*
Lactucæ.
Asteroma malorum. *Berk.*
Botrytis crustosa, *Fr.*
Septoria Anemones, *Desm.*
Botrytis farinosa, *Fr.*
Uredo Campanulæ, *P.*
—— cylindrica, *Strauss.*
Sphæria maculæformis, *P.*
Uredo Filicum, *Desm.*
Æcidium Behenis, *Dec.*
———— Primulæ, *Dec.*
Uredo Circææ, *A. & S.*
Puccinia Ulmariæ, *Dec.*
Agaricus stipitarius, *Fr.*
Botrytis destructor, *Berk.*
Asteroma labes, *Berk.*
Phacidium Ranunculi, *Lib.*
Puccinia Epilobii, *Dec.*
Uredo Valerianæ, *Duby.*
Puccinia Primulæ, Grev.

Anatomical Manipulation. By Alfred Tulk and Arthur Henfrey. The object of this work is to furnish the student with a guide to pursuing practical investigations in Comparative Anatomy and Physiology. Part 1. treats of Mechanical Arrangements, Dissecting Instruments, Injections, &c. Part 2. the Microscope, and the method of using it; and Part 3. Directions for Dissecting and Preserving the different systems of Organs throughout the Animal Kingdom. With an Appendix.

PROCEEDINGS OF LEARNED SOCIETIES.

ENTOMOLOGICAL SOCIETY.

September 5th, 1842.—W. W. Saunders, Esq., F.L.S., President, in the Chair.

Mr. Ingall exhibited a monstrous specimen of *Bombyx castrensis*, one side of which was male and the other side female, the division being visible throughout the whole extent of the body.

Mr. Douglas exhibited a specimen of *Notodonta Tritophus*, a moth new to Britain, which he had reared from a larva found near Colchester in July last.

Numerous specimens of *Colias Hyale* were exhibited by Messrs. Evans and Stevens, captured in Kent, Middlesex and Sussex; and many other captures of the same species in various localities were also mentioned by different members present, Mr. Marshall stating that it was the opinion of Mr. Hoyer, that the great number which had been observed was owing to the default of the crops of clover last year, when a large supply of seed was obliged to be obtained from Trieste, with which it was supposed that the eggs had been imported. Other members, however, considered that this species was periodical in its appearance, and that the present season was one of the periods of its apparition.

Mr. S. Stevens also exhibited a fine specimen of *Catocala Fraxini*, captured a few evenings previous to the Meeting in his garden at Hammersmith, having been attracted by sugar daubed upon the trunk of a fruit-tree.

The following memoirs were read :—

"Note on a species of Acarideous insect which deposits its eggs in great numbers upon stones on commons." By W. W. Saunders, Esq.

"Notes on the habits of *Megachile Willughbiella?* and *Megachile centuncularis*." By George Newport, Esq., V.P.E.S.

The first portion of this paper contained an account of the formation of the nests of the former of these species of bees in the swing-pole or lever of one of the gates of the locks at Gloucester, communicated by Mr. Clegram; the situation selected by the bees being evidently very favourable to them, as in a space of fifteen inches long by five inches square, as many as 300 cocoons were found; the operations of the bees were also shortly described (long previously and more completely detailed by Reaumur and others). The second part of the paper comprised a series of minute observations by the author relative to a variation observed in the economy of the latter species, a female of which had been observed to employ not only rose leaves, but particles of cotton cloth very finely carded or picked to pieces, in the construction of its nest, and which Mr. Newport afterwards discovered was adopted with the view of filling up cavities in the base of the hole in which it had made its nest.

Notice by Mr. A. White of a monstrous specimen of *Prionus (Macrotoma) Senegalensis*, in which both antennæ are furcate from

the third joint; and of a Cimicideous insect from Sierra Leone (*Probœnops dromedarius*, Wh.), presented to the British Museum by the Rev. D. F. Morgan, and subsequently described in the 'Zoologist.'

Extract of a letter from Captain Boys to the Rev. F. W. Hope, dated Almorah, April 27, 1842, containing notices of the habits of various species of Indian insects.

At Mhow (Malwa) he never collected *Oryctes* but in the decaying trunks of the wild date-tree (*Phœnix farinifera*, Roxb.), and constantly near its root. At Almorah, however, he found some larvæ, which he considered to be those of that genus, amongst the oak bark used by the natives for tanning. The want of proper food and moisture he considers to be the cause of the diminutive size of many specimens. In the trunks of the date-trees he also found the larvæ of a large species of *Calandra*. In the high districts of Mhow he found *Colliuris* and *Casnonia* in profusion: the latter also was found "common enough down below," but not the former. He found carrion insects comparatively few: many species of *Hister*, and as far as his own experience of the plains went, one species of *Silpha*, one of *Oiceoptoma* (neither very numerous), and *Necrobia* and *Clerus* in abundance, were nearly the sum total.

He also describes a species of the Heteromerous genus *Platynotus*, which in its habits is a "true burying beetle," and a few of which will sink a crow in the course of a few hours; it simulates death immediately it is touched, contracting its legs close to its abdomen. Many beetles considered purely coprophagous feed upon dead animals, and one of these he noticed to be very select in its choice, namely *Onthophagus igneus*, which he had never been able to take except from the dead bodies of serpents. The only insects he had observed in the nests of the white ants are *Hegeter*, *Scarites*, *Siagona*, and some species of spiders.

Paussus he never found there, but he has no doubt that it is the case, as he is inclined to think that it ought to be placed either with or near the *Carabidæ*, principally because he had observed that several species possess the power of crepitating and discharging a vapour which has the same smell and properties as that discharged by the *Brachini*, and that the joints of the tarsi, when the fresh insect is examined, prove to be five in each leg, and though the first is very minute, yet it is well defined. He had taken *Paussus* by sweeping among high herbage, but most frequently by spreading out a sheet with a lighted candle in the centre on a dark night.

Continuation of a memoir containing descriptions of new species of *Coleoptera* from Port Essington, in New Holland. By the Rev. F. W. Hope.

HETEROMERA.

TRIGONOTARSUS*, Hope, nov. gen.

Forma ferè orbicularis. Cælo *affinis Eschscholtzii.* Antennæ 11-*articulatæ, extrorsùm magnitudine increscentes, ternis ultimis*

* τριγωνὸς, *triangulus*, et ταρσὸς, *tarsus*.

majoribus. Caput *clypeo integro, ultimo articulo palporum cylindrico, apice acuto, præcedenti majori.* Thorax *anticè emarginatus, scutellum nullum.* Elytra *posticè acuminata.* Tibiæ *anticæ trigonæ externèque dentatæ, reliquæ simplices.*

Sp. 1. Trigonotarsus Australis, Hope. *Fuscus, antennis apice piceis; thorace piloso, elytrisque concoloribus; corpus infrà squalidum et tomentosum; tibiis anticis rubris, antrorsùm trigonis externè dentatis, dente majori in medio posito.* Long. lin. $2\frac{1}{2}$, lat. lin. $1\frac{1}{2}$.

I have thought proper to make the above insect the type of a new genus; it approaches nearly to *Cœlus* of Eschscholtz: as it is my intention to figure it shortly, I pass on to other *Heteromera* of New Holland.

Sp. 2. Tagenia funerosa, Hope. *Nigra, antennis pilosis; capite anticè depresso; thorace parùm convexo; elytris striato-punctatis et hirsutis, pedibusque nigris.* Long. lin. 2, lat. lin. $\frac{1}{2}$.

This insect inhabits Van Diemen's Land.

Sp. 3. Tagenia leucospila, Hope. *Nigra, antennis incrassatis et pilosis, capite punctato albisque capillis asperso; thorax transversè impressus et punctulatus; elytra fortiter punctata, punctis duplici serie signatis lineisque aliquot elevatis pilosis, variisque maculis albis pilosis per discum aspersis pedibusque nigris.* Long. lin. 2, lat. lin. $\frac{1}{2}$.

This species occurs at Port Essington and at Swan River, and I believe also at Van Diemen's Land.

Sp. 4. Platynotus insularis, Hope. *Niger, capite ferè quadrato; thorace glabrato, posticè angulato, marginibus elevatis; elytra excavato-punctata, apicibus subacutiusculis; corpus infrà nigrum, tarsis piceis.* Long. lin. 7, lat. lin. 3.

I have received this insect from Melville Island; a very minute specimen has reached me also from Port Essington.

Sp. 5. Opatrum sphæroides, Hope. *Nigrum, clypeo emarginato, antennis ultimis articulis increscentibus et piceis; thorax punctulatus; elytra rugosa, subtuberculata, pilosa; corpus infrà nigrum, pedibus concoloribus, tarsis exceptis piceis.* Long. lin. $2\frac{1}{4}$, lat. lin. $1\frac{3}{4}$.

Sp. 6. Opatrum piceitarsis, Hope. *Fuscum, capite anticè impresso, antennis piceis; thorax ferè quadratus, angulis anticis parùm productis et acutis, posticis vix rectis; elytra striato-punctata; thorace triplo longiora; corpus infrà fusco-griseum, femoribus tibiis concoloribus tarsisque piceis.* Long. lin. $3\frac{3}{4}$, lat. lin. 1.

Sp. 7. Isopteron Opatroides, Hope. *Fuscum, antennis rubro-piceis; thorace angulis anticis subacutis, posticis ferè rectis; elytra striato-punctata; corpus infrà atrum punctatum, femoribus tibiis concoloribus tarsisque piceis.* Long. lin. 4, lat. lin. $1\frac{1}{4}$.—Hab. Western Australia.

Sp. 8. Asida serricollis, Hope. *Nigra, antennis tarsisque piceis; thorace valdè emarginato lateribusque externè serratis; elytra aliquot lineis minutis punctisque elevatis per totum discum*

aspersis; corpus infrà concolor, tarsis exceptis piceis. Long. lin. $4\frac{1}{2}$, lat. lin. 2.

Sp. 9. Endophlæus Australis, Hope. *Flavo-brunneus, antennis nigricantibus pilosis; thorax angulis anticis parùm productis, posticis rectè acutis, disco lineâ longitudinali maculâ utrinque nigricanti insignito; elytra flava brunneoque colore variegata; corpus infrà concolor, tarsis infrà flavo-comatis.* Long. lin. $3\frac{1}{2}$, lat. lin. $1\frac{1}{2}$.

Sp. 10. Endophlæus variicornis, Hope. *Niger, antennis atris articulis quibusdam flavis et pilosis; capite atro nitido; thorax excavatus, anticè niger, posticè flavus, maculis duabus atro-pilosis ante scutellum positis; scutellum flavum; elytra sulcata, lineato-punctata, flavo brunneoque colore variegata; corpus infrà griseo-flavum.* Long. lin. $2\frac{1}{2}$, lat. lin. 1.

I received the above from the vicinity of Adelaide.

Sp. 11. Neomida tetraspilota, Hope. *Atra, capite anticè rubro; thorace nigro et nitido; elytra concoloria, quatuor maculis rubris insignita, binæ ad humeros binæque aliæ ad apicem positæ; corpus infrà nigrum, pectore utrinque rufescenti, pedibusque rubris.* Long. lin. $1\frac{3}{4}$, lat. lin. $\frac{1}{2}$.

Sp. 12. Tetraphyllus sumptuosus, Hope. *Violacea, antennis concoloribus; thorace anticè posticèque cyaneo, lateribus auratis; elytra striato-punctata, binis fasciis auratis insignita apicibusque concoloribus, medio disci lætè violaceo maculisque duabus cyaneis ante apicem positis; corpus infrà abdomine violaceo, pectore femoribus auratis, tibiisque cyaneis.* Long. lin. $2\frac{1}{2}$, lat. lin. $1\frac{1}{2}$.

Sp. 13. Cnodulon longipennis, Hope. *Affine* Cn. cupreo, Fab. *Oblongum, thorace atro; elytris viridi-purpurascentibus striato-punctatis, punctis minutis; corpore infrà atro et nitido.* Long. lin. $7\frac{1}{2}$, lat. lin. $3\frac{1}{2}$.

Sp. 14. Cnodulon cupripennis, Hope. *Oblongum, thorace atro-æneo, subtilissimè punctulato, antennis nigris; elytra cupreo-ænea, vix sub lente striato-punctata, punctis sparsim aspersis; corpus infrà nigrum.* Long. lin. $6\frac{1}{2}$, lat. lin. $3\frac{1}{4}$.

Sp. 15. Cnodulon cupricolle, Hope. *Oblongum, thorace rosi-cupreo glabro, antennis atris; elytra olivaceo-viridia, lineato-punctata, punctis minutis; corpus infrà nigrum.* Long. lin. $5\frac{1}{2}$, lat. lin. $2\frac{1}{2}$.

The above insect inhabits Melville Island.

Sp. 16. Cnodulon puncticolle. *Oblongum, thorace atro, punctulato; elytris cupreo-æneis sulcato-punctatis, sulcis fortiter punctatis, punctis inter strias minutis; corpus infrà nigrum et nitidum.* Long. lin. 6, lat. lin. 3.

Sp. 17. Cnodulon sulcipennis, Hope. *Oblongum, thorace atro glabro elytrisque cupreo-æneis sulcato-punctatis, sulcis fortiter impressis, interstitiis striarum lævibus; corpore infrà nigro et nitido.* Long. lin. $4\frac{1}{2}$, lat. lin. 2.

Sp. 18. Cnodulon picicorne. *Oblongum, thorace atro antennisque piceis; elytra cupreo-ænea purpurascentia, striato-punctata; corpus infrà nigrum, femoribus concoloribus, tibiis tarsisque brunneo-piceis.* Long. lin. 4, lat. lin. $1\frac{3}{4}$.

Sp. 19. Cnodulon cyanipennis, Hope. *Oblongum, thorace trapezoidali nigro, anticè contracto, posticè dilatato ; elytra lætè cyanea, striato-punctata ; corpus infrà nigrum, pedibus antennisque concoloribus, antennis quatuor ultimis articulis magnitudine increscentibus ; tarsis infrà flavo-comatis.* Long. lin. 6, lat. lin. 2.

This insect, from the shape of the thorax, ought to be separated from *Cnodulon.*

Sp. 20. Cnodulon anthracinum, Hope. *Atrum, præcedenti affine ; caput ferè quadratum, antennis palpisque piceis ; thorax glaber, elytris striato-punctatis ; corpore infrà concolori et nitido.* Long. lin. 4, lat. lin. $1\frac{3}{4}$.

I possess about ten other species of *Cnodulon* which are undescribed. It appears that there are two, if not three, subgenera included at present amongst the New Holland insects ranked as *Cnodulon.*

Sp. 21. Tenebrio longipennis. *Niger, thorace ferè quadrato, angulis anticis rotundatis, posticis acutis et denticulatis ; elytris striato-punctatis nitidis atris ; corpore infrà pedibusque concoloribus.* Long. lin. 8, lat. lin. 2.

Sp. 22. Tenebrio convexiusculus, Hope. *Niger, præcedenti affinis at minor ; thorace convexiori ; elytris fortissimè punctatis, punctisque majoribus valdè impressis.* Long. lin. 6, lat. lin. $1\frac{1}{2}$.

Sp. 23. Tenebrio cyanipennis, Hope. *Ater, antennis brunneo-piceis ; thorace nigro-violaceo, ferè glabro ; elytris striato-punctatis et cyaneis ; corpus infrà nigrum, femoribus tibiis piceis, tarsisque infrà flavo-comatis.* Long. lin. $5\frac{3}{4}$, lat. lin. $1\frac{1}{2}$.

Sp. 24. Helops latipennis, Hope. *Nigro-chalybeus, thorace ferè quadrato depresso et punctato ; antennis atris, quatuor ultimis articulis piceis ; elytra thorace latiora, posticè parùm dilatata, subtilissimè punctata et viridi-chalybea ; corpus infrà nigrum nitidum, femoribus tibiis palpisque piceis, tarsisque infrà flavo-comatis.* Long. lin. 10, lat. lin. 4.

Sp. 25. Allecula Pimeloides, Hope. *Nigra, antennis piceo-tomentosis ; thorace convexo, angulis anticis rotundatis ; elytra thorace triplo longiora, subacuminata, striato-punctata, striis haud fortiter impressis ; corpus infrà nigrum, ultimo segmento abdominis in medio flavo-maculato.* Long. lin. 8, lat. lin. $2\frac{1}{2}$.

Sp. 26. Allecula Omophiloides, Hope. *Nigra, thorace depresso convexo, angulis posticis subacutis, lateribus medio dilatatis; elytra striato-punctata, posticè valdè dilatata ; corpus infrà nigrum punctatum tarsisque infrà flavo-comatis.* Long. lin. 6, lat. lin. 2.

Sp. 27. Allecula melancholica, Hope. *Nigra, thorace ferè rotundato, punctulato, elytrisque striato-punctatis, posticè gradatim dilatatis, corpus infrà nigrum.* Long. lin. $5\frac{3}{4}$, lat. lin. $1\frac{1}{2}$.

Sp. 28. Allecula canescens, Hope. *Fusco-grisea, thorace albido-tomentoso ; elytris striato-punctatis, fusco-cinerascentibus seu albidis capillis obsitis ; corpus infrà concolor.* Long. lin. 6, lat. lin. 2.

Sp. 29. Allecula foveicollis, Hope. *Picea, thorace glabro, foveâ impressâ rotundatâ utrinque notato ; elytra striato-punctata,*

picea, punctis fortiter insculptis; corpus infrà concolor, pedibus pallidioribus. Long. lin. 5, lat. lin. $1\frac{1}{4}$.

Sp. 30. Allecula Gouldii. *Affinis præcedenti at minor; picea, thorace glabro convexo; elytris parùm pallidioribus striato-punctatis, punctis leviter impressis; corpus infrà rubro-piceum.*

Named in honour of Mr. Gould, the ornithologist.

Sp. 31. Allecula nigricans, Hope. *Atro-picea, thorace punctulato; elytris striato-punctatis, interstitiis striarum sparsim punctatis; corpus infrà piceum, pedibus concoloribus.* Long. lin. $4\frac{1}{2}$.

This species was also sent to me by Mr. Gould from Port Essington.

"Notice of a case of *Myasis*," by Dr. Henry Johnson (communicated by the Rev. F. W. Hope), in which specimens of the larvæ of *Anthomyia canicularis* had been discharged, in June 1842, by the aid of moderately active aperients, from the stomach of Elizabeth Ball, aged 35, the wife a hawker (and who had for six months previously been ill) at Shrewsbury, specimens of which had been forwarded to Mr. Hope, together with a highly magnified figure of the insect, drawn by W. A. Leighton, Esq., agreeing with that figured in the Transactions of the Entomological Society. Dr. Johnson moreover suggested the inquiry, whether the larvæ produce the disorder of the stomach, or are they secondary consequences of unhealthy digestion? the latter opinion gaining ground at the present time among medical men.

The Rev. F. W. Hope also communicated an extract of a notice by Dr. Davis of Presteign, from the Proceedings of the Exeter Meeting of the Provincial Medical and Surgical Association, containing a notice of a case in which a number of *Millepedes*, or wood-lice as they were termed (but which proved upon examination to be a species of *Oniscus*), had been discharged from the stomach of a boy fifteen years old, who for some months had complained of pain in his stomach which did not yield to common remedies, until he was relieved by a strong emetic which caused him to vomit a considerable number of these insects, mostly alive and full-grown, but wanting the brown colour of those found in natural situations, being chiefly white. There were sufficient to have filled a common-sized teacup. Dr. Davis considered that the ova had been swallowed by the boy with his food, especially as he has frequently observed the insects buried in bacon, which is sometimes eaten raw by children.

The Rev. F. W. Hope also stated that he had lately seen at Tunbridge Wells the larva of a Coleopterous insect which had caused severe illness in a female until it was removed by violent medicine.

October 3.—W. W. Saunders, Esq., President, in the Chair.

The President exhibited some singular exotic Hymenopterous insects belonging to the genera *Nomia* and *Eucharis*.

Mr. Thurston Thompson exhibited a specimen of the small common edible crab (*Carcinus mænas*), on the back of which a madrepore had grown several times larger than the crab.

The Secretary read some extracts from a letter addressed to himself by Robert Templeton, Esq., R.A., at present at Colombo in

Ceylon, containing minutely detailed descriptions of several species of the genera *Cermatia* and *Lepisma*, accompanied by drawings.

"Description of a new genus of *Lucanidæ* from New Zealand." By Captain F. Parry, F.L.S.

MITOPHYLLUS, Parry. *Forma* Platyceri Caraboides *at magis cylindricus, apice elytrorum rotundato; antennæ* 10-*articulatæ, articulis 3bus ultimis ♂ intùs ramum valdè elongatum pilosum singulatim emittentibus; mandibulæ ♂ crassæ porrectæ, capitis longitudine, apice curvatæ et in dentem erectum suprà productæ; maxillæ parvæ, lobo externo laciniiformi; mentum magnitudine mediocri lateribus rotundatis.*

Mitophyllus irroratus, Parry. *Rubro-piceus, maculis obscuris atris, per totum corpus aspersis; mandibulis porrectis recurvis, anticè acutis posticèque denticulatis; tibiis* 4 *anticis in medio extùs unidentatis.* Long. corp. lin. 4½.—Habitat in Novâ Zelandiâ apud portum Nicholsoni.

The commencement of a memoir on various genera belonging to the families *Geotrupidæ* and *Trogidæ*. By J. O. Westwood, Esq.

November 7.—W. W. Saunders, Esq., President, in the Chair.

The Rev. F. W. Hope exhibited various new and beautiful insects from the Kasya Hills near Sylhet.

Mr. W. W. Saunders exhibited a box of *Hymenoptera* and *Diptera* from Albania, collected by S. S. Saunders, Esq., British Consul there, and comprising several of considerable interest: also some of the nests of *Mygale Ionica*.

Mr. F. Bond exhibited and subsequently presented to the Society a specimen of *Locusta Christii*, taken at Childs-hill near Hampstead in August last. He had kept it alive more than a month, feeding it on grass, which it devoured with great voracity. He also exhibited a drawing of a monstrosity occurring in one of the claws of the common crab, which was doubled.

Mr. Lovel exhibited specimens of a small species of *Apate*, which had proved extremely injurious to walnut-tree gun-stocks imported from Dauphiny, the insects burrowing into the heart of the wood whilst in a green state. Many former cargoes had been received without any such injury, and it was desirable to learn under what circumstances this injury might be prevented, or at what period of the year it would be most serviceable to cut down the stocks so as to prevent the damage.

Mr. S. Stevens exhibited a long series of British *Noctuæ* belonging to the genus *Nonagria*, clearly proving that *N. lutosa*, *pilicornis* and *crassicornis* are but varieties of one species.

Mr. Westwood exhibited specimens of a Noctuideous larva, apparently of the genus *Agrotis*, forwarded to him by Dr. Johnston of Berwick-upon-Tweed, which had proved extremely injurious to the potatoe crops in that neighbourhood.

The following memoirs were read:—

A detailed account of the case of *Myasis* noticed at the last Meet-

ing of the Society by Dr. H. Johnson, with references to an analogous case reported in the Medical Transactions (vol. i. p. 53), and to Dr. A. Farre's paper on the anatomy of the larva of *Anthomyia canicularis*, published in the Transactions of the Microscopical Society, vol. i. pt. 1. p. 51.

"Notices of Entomological captures at Stockton-upon-Tees." By John Hogg, Esq., F.L.S., &c.; namely, two specimens of *Vanessa Antiopa*; one seen on August 7, 1831, and the other taken on September 2, 1842, at Norton House, the residence of the writer. Also a specimen of *Vanessa Cardui* in 1842, not seen since 1826 and 1834. *Argynnis Paphia*, captured August 28,1828, and again in September 1842 on flowers; thus being later in the time of their appearance than in the south of England. The caterpillars of *Sphinx Atropos* were abundant in potatoe-fields in October 1837, and again in 1842; but the only *moth* of that species was caught there about thirty-two years since.

Vespa Britannica, Leach, had been not uncommon, its nest not being larger than an orange, and of a very beautiful and delicate workmanship. One of the specimens taken out of one of these nests is so much larger in its size, that Mr. Hogg considers it to be the queen-wasp, or mother of the nest, as she was the only one of the colony which would not leave the nest, which was taken on the 30th of July; the wasps which escaped therefrom, six or eight in number, immediately beginning to build another near the same spot, and suspending it to the dry stalk of the garden pea, working at it most diligently for four days, when they forsook it, owing either to the queen-wasp being taken or to the rain and decay of the pea-stalk. The fine paper-like substance of which the nest was composed was formed by the wasps chewing pieces of the dry *old pea leaves*, as he had observed.

Another species (which, from constructing a much larger nest under the branch of a bush, he considered to be *Vespa Holsatica*?), whilst building the nest, busily ate or gnawed the membrane or portion of the *green leaves* of a purple gage-plum tree which was close to their nest, and to and from which they quickly flew and returned.

Vespa vulgaris elaborates a coarser and stronger substance for the manufacture of its nest, and which is chiefly composed of decayed wood; as Mr. Hogg had often seen these wasps busily gnawing the decayed part of a gate-post, &c., and then fly off to their nest: in fact he adds, that "one of the easiest modes of discovering their nests is to follow them when they are so engaged."

Continuation of a memoir on the *Geotrupidæ* and *Trogidæ*. By J. O. Westwood, F.L.S.

"Descriptions of some new Coleopterous insects from the Kasya Hills, near the boundary of Assam." By the Rev. F. W. Hope.

Lucanus Cantori. *Piceo-brunneus aurataque pubescentia tectus; mandibulis exsertis in medio dente majori armatis apicibus subfurcatis; clypeo deflexo trigono, thorace fere ut in* L. bilunifero, *femoribus rubro-corallinis.* Long. corp. ♂ lin. 31, ♀ 18. *Affinis* L. villoso, Hope.

Lucanus Mearesii. *Niger, mandibulis exsertis in medio unidentatis, apicibus latè furcatis, dente parvo ferè ad basin posito; elytris nigro-æneis nitidis et subtilissimè punctulatis capillisque flavis aspersis, tibiis rubro-piceis.* Long. (mand. inclus.) lin. 28. From Sylhet. *Affinis præcedenti.*

Lucanus platycephalus. *Niger, mandibulis thorace parùm longioribus, apicibus furcato-dentatis; caput anticè latum, ultra oculos porrectum; thorax transverso-quadratus, utrinque posticè fossulatus; elytra ferè glabra, corpus infrà concolor.* Long. lin. 10.

Lucanus Maclellandi. *Rubro-piceus, mandibulis capite thoraceque minoribus internè multidentatis, apicibus acutis; capite anticè fossula supra oculos impresso sparsimque subvarioloso; thorace angulis posticis obliquis; tibiis anticis externè subdenticulatis, posticis* 4 *inermibus.* Long. lin. 8.

Dorcus Antæus. *Niger, nitidus et glabratus, sub lente tenuissimè granulatus, latissimus valdè depressus; elytris lævibus, clypeo lato; mandibulis deplanatis, intùs dente forti armatis, apicibus acutis; tibiis anticis denticulatis, posticis* 4 *unidentatis.* Long. lin. 31.

Received from Dr. Cantor, and allied to *Lucanus Titan*, Bdv., *L. bilunatus*, DeH., and *L. bucephalus*, Westw.

Dorcus Tityus. *Niger, mandibulis capite thoraceque æqualibus, internè denticulatis, dente forti ferè ad basin posito, apicibus subfurcatis; caput thorace latius, clypeo subbifido; thorax semilunaris, lateribus in medio dilatatis; elytra gradatim attenuata; tibiæ anticæ multidentatæ.* Long. lin. $29\frac{1}{2}$. From Sylhet. Unique in Captain Parry's collection.

Dorcus Reichei. *Niger, capite thoraceque æqualibus, mandibulis ad basin inermibus, ante apicem dente forti subbifido armatis, apicibus subfurcatis; elytra thorace parùm minora atro-castanea; corpus infrà nigrum.* Long. lin. 24. From the Kasya hills and also from Sylhet.

Dorcus punctilabris. *Niger, mandibulis exsertis; capite thoraceque minoribus, internè bidentatis, dentibus minutis apicibusque acutis; elytra lineato-punctata, punctis aspersis; tibiis anticis multidentatis,* 4 *posticis unidentatis.* Long. lin. $17\frac{1}{2}$.

Dorcus Blanchardi. *Affinis præcedenti, niger; mandibulis exsertis, capite thoraceque minoribus subvarioloso-punctatis, dente robusto ad medium posito, secundo minuto, apicibusque acutis; elytra crebrissimè punctulata; pedes sicut in specie præcedente.* Long. lin. 16.

Dorcus cognatus. *Affinis præcedenti, niger; mandibulis impunctatis, dente forti ferè in medio posito, 2ndo valdè minuto; elytra glabra nitida, lateribus lineato-punctatis; pedes ut in* D. Blanchardi. Long. lin. 17.

From the Himalayas. In Captain Parry's collection.

Dorcus Chevrolatii. *Affinis* D. Saigæ, Fabr. *Niger, mandibulis exsertis arcuatis; capite longioribus in medio, intus lato dente armatis, apicibus subfurcatis; elytra piceo-castanea, ferè glabra*

ad apicem gradatim decrescentia; corpus infrà nigro-piceum. Long. lin. 26.

Dynastes Cantori. *Atro-piceus, cornu capitis recurvo robusto; thorace anticè bicornuto; elytris obscurè piceis, marginibus externè pallidè castaneis; corpus infrà rubro-piceum; tibiis tarsisque nigricantibus.* Long. ♂ lin. 26, ♀ lin. 24.

Lamia Downesii. *Affinis* L. Roylii, Hope, *at minor. Nigra, antennis corpore longioribus; elytris apicibus internè et externè mucronatis, ad basin scabris maculis decem flavis notatis; corpus infrà fusco-nigrum.* Long. lin. 27.

Lamia Parryi. *Griseo-nigra, antennis corpore longioribus articulis scabris, elytris ad basin mammillato-scabris maculis albis* 8 *notatis; corpus infra fusco-griseum, lateribus albo-vittatis.* Long. lin. 17½.

From Sylhet.

Mr. Edward Doubleday mentioned that he had observed a specimen of the female of the singular Lepidopterous genus *Epicopeia*, Westw., in a collection of Indian insects recently arrived in England, and in which the antennæ are perfectly simple.

ZOOLOGICAL SOCIETY.

December 13, 1842 (*continued*).—Prof. Rymer Jones in the Chair.

The exhibition was resumed of hitherto undescribed *shells* contained in the collection formed by Mr. Cuming in the Philippine Islands, and the following descriptions of them, by Dr. J. H. Jonas, were communicated to the Meeting.

Helix Zeus. *Hel. testâ perforatâ, orbiculatâ, subdepresso-convexâ, rugis obliquis striisque spiralibus elevatis sculptâ; anfractibus* 4½ *convexis; ultimo medio angulato, supra carinam depresso, infràque inflato; colore brunneo, lineis flavis ziczacformibus obliquis supernè pictâ, infernè rubrâ, fasciâ latâ fuscâ infra carinam ornatâ; aperturâ subtrapeziformi, fauce albâ, peritremate acuto, recto, supra umbilicum reflexo.*

Hab. ad insulam Mindoro, Philippinarum.

Altitudo, 1⅛ poll; latit. 2⅛ poll.

This species bears a great resemblance to *Hel. Otahaitana.* The rugulosities on the upper part are more elevated, as on the under side, where the regular concentric lines are more distinctly visible.

Bulimus calobaptus. *Bul. testâ umbilicatâ, ovato-pyramidali, tenui, subdiaphanâ, nitidâ, rubrâ vel pallidâ, fasciis flavis undulosis longitudinaliter pictâ, striis incrementi subtilissimis spiralibusque oculo nudo vix conspicuis decussatâ; anfractibus* 5½ *convexis, suturis appressis, ultimo dimidiam testæ partem ferè æquante; aperturâ ovali, intùs albâ, marginibus reflexis, albis, sinistro umbilicum partìm occultante.*

Longit. 1½ poll.; latitudo, ⅝ poll.

Hab. ad insulam Mindoro, Philippinarum.

In form this beautiful shell resembles *Bul. Myersii*, Müller.

Var. *a.* Ground-colour brownish red and shining; the longitudinal

zigzagged stripes are of a golden yellow colour, and on the last volution they are interrupted by a brown transverse line.

Var. *b*. Ground-colour pale yellow; the longitudinal stripes as in Var. *a*. No transverse line on the last volution.

Bulimus balanoides. *Bul. testâ imperforatâ, ovatâ, albâ, epidermide flavâ, vittis spadiceo-rufis cinctâ; anfractibus senis convexiusculis, ultimo cæteros vix æquante, basi viridi; aperturâ ovatâ, intùs albâ, peritremate incrassato, reflexo, albo, fusco-marginato; columellâ rectâ.*

Longit. $1\frac{1}{2}$ poll.; latit. $\frac{7}{8}$ poll.

Hab. ad insulam Mindoro, Philippinarum.

This shell bears great resemblance to the *Bul. ovatus*. The body-whorl has three brownish bands, and the others have two, one in the middle and the second on the suture; this last band is interrupted by the epidermis, so that it seems as if this band was sprinkled with red and yellow spots. The base of the last whorl is of a green colour where the columella is reflected.

Bulimus aplomorphus. *Bul. testâ imperforatâ, ovato-conoideâ, tenuissimè striatâ, nitidâ albâ, epidermide luteâ; anfractibus senis convexis, ultimo spirâ paululùm breviore, fasciis tribus rufo-fuscis circumdato; unâ angustâ ad suturam, alterâ latiore in medio, tertiâ circa columellam; aperturâ ovatâ, albâ, peritremate reflexo albo, columellâ rectâ.*

Longit. $1\frac{5}{8}$ poll.; latit. $\frac{7}{8}$ poll.

Hab. ad insulam Mindoro, Philippinarum.

This shell is like *Bul. guimaracensis*, but more slender, and the proportions of the volutions differ.

Bulimus simplex. *Bul. testâ imperforatâ, ovato-conoideâ, tenui, diaphanâ, candidâ, epidermide tenuissimâ, viridi, supernè evanescente; anfractibus quinis convexis, subtiliter striatis, lineisque spiralibus oculo armato solummodò conspicuis circumdatis, suturis haud marginatis; ultimo anfractu dimidiam testæ partem ferè æquante, obtusè angulato; aperturâ ovatâ, peritremate acuto, subreflexo, intùs limbato; columellâ filiformi rectâ.*

Longit. 1 poll.; latit. $\frac{3}{4}$ poll.

Hab. ad insulam Mindoro, Philippinarum.

Though this *Bulimus* on the first sight bears great resemblance to the *Bul. bullula*, it is still very distinct.

Mr. Fraser then characterized two new species of Birds from Western Africa.:—

Strix Poensis. *Strix rostro cærulescenti-corneo; facie albâ, disco plumarum confertissimarum, texturâ holosericâ, circumdatâ,—illis anticè positis albis, posticis flavis, ad basim pallentibus,—illis autèm genarum apicibus nigris; corpore supernè, e cervino flavo, albo et purpureo crebrè adsperso, plumarum omnium scapis bis terve albo guttatis cum spatio nigro inter singulas guttas; colli lateribus flavis, et, ut apud dorsum, guttatis; primariis et secondariis ferè obsoletè fasciatis, et sordidè purpureo alboque, sparsè guttatis;*

caudâ vix furcatâ, rubescenti-flavâ, fusco-fasciatâ, et sparsè albo guttatâ; corpore subtùs femoribusque flavescenti-albis guttis triangularibus nigrescentibus, sparsè notatis tarsis lanugine brevi, albâ, ferè ad digitos sparsè tectis,—his nigris, pilis albis obsitis.

Hab. Fernando Po.

The specimen from which the above description was taken was procured at Clarence, Fernando Po, and was the only one that had been seen by the oldest colonist at that place.

Pitta Pulih. *Pitta notâ nigrâ a mandibulæ superioris basi, super verticem usque ad collum eductâ, et utrinque notâ latâ cervinâ marginatâ; plumis auricularibus et colli lateribus nigris; dorso, tectricibusque alarum majoribus metallicè viridibus; tectricibus alarum minoribus, tectricibusque caudæ singulis, ad apices pallidè cæruleis, instar cyani; primariis, secondariis, rectricibusque caudæ nigris; primariis tertiâ, quartâ, quintâ et sextâ per medium albo fasciatis; gulâ ferè albâ corpore subtùs fuscescente-aurantiaco, rubido apud abdomen imum leviter tincto; rostro, tarsis, digitis, unguibusque apparenter rubris.*

Hab. apud pagum, Port Lokkoh dictum, Sierra Leone.

Mr. Fraser observed that considerable interest was attached to this bird, for which he was indebted to Robert Clarke, Esq., Senior Assistant Colonial Surgeon at Sierra Leone—not only on account of its being a new species of a somewhat restricted group, but on account of its habitat, all the hitherto recorded species of *Pitta* being from continental India, the Indian islands, and Australia.

Mr. Thomson, who originally procured the bird, observes in a note, that the *Pulih,* or Mocking Bird, is only found in the Timneh country; that its note is exceedingly sweet, and when a Timneh would pay an orator or poet the greatest compliment, they say, "He is a perfect Pulih."

It is most closely allied to *Pitta brachyura,* Auct.; but differs from that bird in having the bill and feet red, a band over the eye, which is tawny, instead of olive brown; in the uniform colouring of the primaries, secondaries and tail feathers, the two former not being tipped with white, nor the latter with green; and finally, in the absence of the red vent.

The following "Additional Measurements of the Blood-Corpuscles or Red Particles of Mammalia and Birds," by George Gulliver, Esq., F.R.S., were read:—

"Many observations are yet required to complete our knowledge of the comparative anatomy of the blood-corpuscles. The present contribution contains an account of some observations which I have made since the publication, in the English version of Gerber's Anatomy, of my Tables of Measurements of the Blood-corpuscles of Mammalia and Birds.

"In the present, as in the former tables, the measurements are all expressed in vulgar fractions of an English inch, and as the numerator is invariably 1, it is omitted throughout, the denominators only being printed. In each instance the measurements of the common-

sized discs are first set down; a space is then left; the small and large-sized discs are next noted; and lastly the average, deduced from the preceding numbers, is placed beneath the line. The long diameter of the oval blood-discs is denoted by L.D. and the short diameter by S.D. Except when noted to the contrary, the blood was obtained from living and adult animals. The measurements of the nuclei were taken after their exposure, by the aid of dilute acetic acid on the corpuscles, which it is necessary to state, since I have elsewhere* shown that the form and dimensions of the nucleus are materially affected by different treatment.

MAMMALIA.

Feræ.

Indian Badger (*Arctonyx collaris*, F. Cuv.) = 3609; blood from the vena cava after death. Malay Sun Bear (*Helarctos Malayanus*, Horsf.) = 3562; blood from a prick of the lip. Red Puma (*Felis unicolor?* Traill) = 4481; blood from a prick of the skin of the arm. Fœtal Kitten, half an inch long (*Felis domestica*, Briss.) = 2233; blood from the heart and from the navel-string immediately after death. The average size of the corpuscles is about twice that of the corpuscles of the mother. The corpuscles of the fœtus contained distinct nuclei, much resembling lymph globules. The size only of the nucleated corpuscles is above given; there were several much smaller which presented no nuclei. Stoat (*Mustela Erminea*, Linn.) = 4155; blood from the heart soon after death.

Ruminantia.

Camel (*Camelus Bactrianus*): L.D. = 3123; S.D. = 5876; thickness of the discs = 15210; pale globules = 3348: blood from a prick of the upper lip. Red Deer (*Cervus Elaphus*, Linn.) = 4324. Fœtus of Fallow Deer (*Cervus Dama*, Linn.) = 3478; blood from the heart, Jan. 2, 1842, a few hours after death. The fœtus measured $4\frac{1}{4}$ inches from the forehead to the buttocks. The corpuscles exhibited no distinct nuclei when treated with water or vegetable acids. The average size of the corpuscles from the uterine veins of the mother was $\frac{1}{4513}$th of an inch. In another fœtus examined Jan. 12, and measuring six inches, the corpuscles did not differ appreciably from those of the first fœtus. Ibex (*Capra Caucasica*); corpuscles slightly smaller than those of the Goat. The measurements are given in this Journal, vol. xi. p. 524. Indian Buffalo (*Bos frontalis*, Lambert) = 4299; blood from a vein of the ear.

Rodentia.

Jerboa (*Dipus Ægyptius*, Hemp. and Ehren.) = 4172; blood from a vein of the ear. Common Porcupine (*Hystrix cristata*, Linn.) = 3369; blood from a prick of the skin of the nose. Common Hare (*Lepus timidus*, Linn.) = 3560; blood from the heart two hours after death.

* See Contributions to Minute Anatomy, Lond. and Edinb. Phil. Mag. for August 1842; and Remarks on the Shape of the Blood-Corpuscles of Oviparous Vertebrata, Annals of Nat. Hist., vol. xi. p. 525.

MARSUPIATA.

Mauge's Dasyure (*Dasyurus Maugei*, Geoff.) = 4034 ; blood from a vein of the ear. The corpuscles scarcely differ in size from those of the Viverrine Dasyure, and agree in form with the corpuscles of the other marsupial animals, originally described by me in the 'Annals of Natural History,' Dec. 1, 1840.

AVES.

RAPACES.

Angola Vulture (*Vultur Angolensis*, Lath.): L.D. = 1684 ; S.D. = 3166.

OMNIVORES.

Common Jay (*Garrulus glandarius*, Flem.) : L.D. = 2064 ; S.D. = 3878 ; nuclei 4000 to 10666 : blood from the heart quickly after death. Rook (*Corvus frugilegus*, Linn.): L.D. = 1894; S.D. = 3196; nuclei 4572 to 9140 : blood from the heart a few hours after death. Magpie (*Corvus Pica*, Linn.) : L.D. = 1953 ; S.D. = 3365 ; thickness of the discs = 11600 ; nuclei 4245 to 11138 : blood from the heart an hour after death. Red-winged Starling (*Sturnus predatorius*, Wilson) : L.D. = 2133 ; S.D. = 4175 : blood from the heart seven hours after death.

INSECTIVORÆ.

Pied Wagtail (*Motacilla alba*, Linn.) : L.D. = 2182 ; S.D. = 3600; nuclei 4000 to 10666 : blood from the heart soon after death. Sedge Warbler (*Sylvia Phragmites*, Bechs.) : L.D. = 2003 ; S.D. = 3550: blood from the heart nine hours after death. The corpuscles are notably larger than those of most of its congeners.

GRANIVORÆ.

Indigo Bird (*Fringilla cyanea*, Wilson) : L.D. = 2144 ; S.D. = 3741 : blood from a vein of the pinion. Greenfinch (*Fringilla Chloris*, Temm.) : L.D. = 2232 ; S.D. = 3600; nuclei 4000 to 10666 : blood from the heart a few minutes after death. Blue Titmouse (*Parus cæruleus*, Linn.) : L.D. = 2313 ; S.D. = 4128 ; nuclei 4571 to 10666: blood from the heart quickly after death. Longtailed Titmouse (*Parus caudatus*, Linn.) : L.D. = 2136 ; S.D. = 4570 ; nuclei 4800 to 10666 : blood from the heart twenty-one hours after death. There were several circular discs, about $\frac{1}{3000}$th of an inch in diameter. Many of these had an oval nucleus, and the circular shape of the discs was perhaps a post-mortem change. Skylark (*Alauda arvensis*, Linn.) : L.D. = 2125 ; S.D. = 4128 ; nuclei 4000 to 12000 : blood from the heart twelve hours after death. Pine Grosbeak (*Loxia enucleator*, Linn.) : L.D. = 2247 ; S.D. = 4083 : blood from a vein of the pinion. Hawfinch (*Loxia coccothraustes*, Temm.) : L.D. = 2042; S.D. = 3790 ; thickness of the discs = 9141 ; nuclei 4570 to 10666 : blood from a vein of the pinion.

ZYGODACTYLI.

Cuckoo (*Cuculus canorus*, Linn.) : L.D. = 2028 ; S.D. = 3600 : blood from the heart twenty-six hours after death. There were many

circular discs, perhaps from the blood being rather stale. These were about $\frac{1}{2900}$th of an inch in diameter.

Chelidones.

Common Swift (*Cypselus Apus*, Flem.): L.D. = 1982; S.D. = 3550; nuclei 4000 to 10666: blood from the heart a few minutes after death.

Columbæ.

Partridge Pigeon (*Columba montana*, Lath.): L.D. = 2239; S.D. = 3692; nuclei 5333 to 12000; pale globules = 3200: blood from a vein of the pinion.

Gallinæ.

Lineated Pheasant (*Phasianus lineatus*, Jard.): L.D. = 1855; S.D. = 3348; nuclei 4570 to 9166: blood from a vein of the pinion. Mountain Partridge (*Tetrao Caucasica*, Pall.): L.D. = 1923; S.D. = 3456; nuclei 4570 to 9166: blood from a vein of the pinion.

Cursores.

Ostrich (*Struthio Camelus*, Linn.); corpuscles slightly larger than those of the Rhea. The measurements are detailed at page 130 of the present volume of this Journal.

Grallatores.

Common Snipe (*Scolopax Gallinago*, Linn.): L.D. = 2170; S.D. = 3622: blood from the heart twenty-four hours after death.

Palmipedes.

Mandarin Duck (*Anas galericulata*, Gmel.): L.D. = 1937; S.D. = 3424: blood from the jugular vein about ten hours after death. Common Gull (*Larus canus*, Linn.): L.D. = 1973; S.D. = 3839; nuclei 3555 to 10666: blood from a vein of the pinion.

Dec. 27.—Richard Owen, Esq., Vice-President, in the Chair.

Descriptions by Mr. Lovell Reeve of new species of shells figured in the 'Conchologia Systematica,' were read.

Dentalium longitrorsum. *Dent. testâ carneolâ, tenui, glaberrimâ, subpellucidâ, longissimâ, arcuatâ, margine acuto.*

Reeve, Conch. Syst., vol. ii. pl. 130. f. 6.

Long. $4\frac{3}{4}$; diam. $\frac{3}{16}$ poll.

Hab. —— ? Mus. Cuming.

This beautiful pink horny-looking shell far exceeds any hitherto described species in length.

Vermetus eburneus. *Verm. testâ eburneâ, subobesâ, laxè volutâ, longitudinaliter costatâ, costis distantibus, subobsoletis.*

Reeve, Conch. Syst., vol. ii. pl. 152. f. 2.

Long. $3\frac{1}{16}$; diam. $\frac{7}{16}$ poll.

Hab. —— ? Mus. Cuming.

Partula inflata. *Part. testâ obeso-conicâ, transversim tenuissimè striatâ, albidâ, epidermide luteo-fuscâ indutâ; anfractu ultimo angulato-inflato, umbilicato; aperturâ subquadratâ, labro planissimè expanso.*

Reeve, Conch. Syst., vol. ii. pl. 175. f. 11 & 12.
Long. $\frac{7}{8}$; diam. $\frac{5}{8}$ poll.
Hab. —— ?

Remarkable on account of the ventricose inflation of the last whorl.

Truncatella scalariformis. *Trunc. testá elongato-cylindraceá, luteolá, anfractibus rotundatis, costellis minutis ubique cingulatis; aperturá rotundá, labro simplici, acuto.*

Reeve, Conch. Syst., vol. ii. pl. 182. f. 6.
Long. $\frac{1}{4}$; diam. $\frac{1}{12}$ poll.
Hab. ad insulam Annaa, in Oceano Pacifico.

A number of these little shells were found by Mr. Cuming at the roots of palms on the sea-shore.

Pyramidella cincta. *Pyram. testá conico-acuminatá, albá, anfractibus lævibus, zoná olivaceo-fuscá, conspicuá, in medio cinctis; aperturá oblongo-ovatá, labro simplici, acuto.*

Reeve, Conch. Syst., vol. ii. pl. 207. f. 2 & 4.
Long. $\frac{3}{4}$; diam. $\frac{5}{16}$ poll.
Hab. —— ? Mus. Cuming.

A white, sharply acuminated shell, surrounded with a single, clear, broad, olive-brown belt.

Pyramidella glans. *Pyram. testá cylindraceo-conicá, bicoloratá; anfractibus longitudinaliter striatis, infernè albis, supernè olivaceo-viridibus; aperturá rotundato-ovali.*

Reeve, Conch. Syst., vol. ii. pl. 207. f. 1.
Long. $\frac{9}{16}$; diam. $\frac{1}{4}$ poll.
Hab. —— ?

This is a small dumpy-looking shell, of which the whorls are just one half white and the other half dark olive-green.

Turbinellus imperialis. *Turb. testá ovato-turbinatá, subtrigoná, epidermide crassá, fibrosá, indutá; transversim liratá, liris angustis, subdistantibus, lirá minutá interveniente; anfractibus supernè angulatis, tuberculis flexuosis squamæformibus coronatis; anfractu ultimo prope basin aliis subsimplicioribus cingulato; columellá rubido-fuscá, politá, irregulariter plicatá; labro undulato, leviter expanso.*

Reeve, Conch. Syst., vol. ii. pl. 229. f. 4.
Long. $3\frac{1}{2}$; diam. $2\frac{1}{4}$ poll.
Hab. —— ? Mus. Cuming.

The noble diadem of flexuous scale-like tubercles with which this shell is crowned, renders it eminently distinct from its congener the *T. cornigerus*, in which they are of a solid stunted growth. The enamelling of the columella is also remarkable, being always of a very peculiar chocolate-brown colour.

Turbinellus vexillulum. *Turb. testá trigono-turbinatá, albá, lineis cæruleis, et interdum roseis, vividè cingulatá; anfractibus subtrigonis, in medio valdè tuberculatis; columellá triplicatá, plicis parvis, canali brevissimo nigerrimo-tincto.*

Reeve, Conch. Syst., vol. ii. pl. 229. f. 1.
Long. $1\frac{3}{4}$; diam. 1 poll.
Hab. —— ?

This beautiful shell, which approximates to the *T. aplustre*, is

vividly lined across with very deep blue, and between every two blue lines is a pink one, presenting an almost artificial contrast of colour.

PLEUROTOMA SPECIOSA. *Pleur. testâ acutè turritâ, transversim subtilissimè funiculatâ; cæruleo-albâ, funiculis pallidè ochraceis; anfractibus in medio eximiè gemmatis, infernè convexis, supernè leviter concavis; canali gracili, vix elongato.*

Reeve, Conch. Syst., vol. ii. pl. 233. f. 5; Conch. Icon. *Pleurotoma*, pl. 2. f. 9.

Long. $2\frac{1}{2}$ poll.

Hab. —— ?

This very chaste shell approaches somewhat in form to the *Pleurotoma carinata*, Gray, Griff. Cuv. An. King. (*Pl. Kieneri*, Doumet); it is of a pale bluish ground, delicately corded and beaded with bright ochraceous yellow. I only know of two specimens, one in the collection of the Rev. Mr. Stainforth, the other in that of the British Museum, purchased at the recent sale of Mr. Inwood's shells.

PLEUROTOMA BECKII. *Pleur. testâ oblongâ, cylindraceo-attenuatâ, apice acuto; sexangulatâ, anfractibus ad angulos longitudinaliter tuberculatis; olivaceo-fuscâ, tuberculis tantum albis; columellâ et aperturæ fauce fuscâ; canali brevissimo.*

Reeve, Conch. Syst., vol. ii. pl. 234. f. 11; Conch. Icon. *Pleurotoma*, pl. 2. f. 10.

Long. $\frac{7}{8}$ poll.

Hab. ad insulam Luçon, Philippinarum.

I dedicate this shell with much pleasure to my friend Dr. Beck, curator of that noble patron of conchological science, the King of Denmark. It was found by Mr. Cuming in the locality above cited under stones at low water. The snowy-white tubercles which ornament this brown six-angled shell at the several angles are very characteristic.

COLUMBELLA PHILIPPINARUM. *Col. testâ conico-turbinatâ, acuminatâ, albâ, fusco profusè et minutissimè undulatâ; anfractibus supernè subangulatis, ultimo basin versus striato, striis profundis; aperturâ oblongâ, angustâ; labro subincrassato, fauce striatâ.*

Reeve, Conch. Syst., vol. ii. pl. 257. f. 9.

Long. $\frac{15}{16}$; diam. $\frac{9}{16}$ poll.

Hab. —— ?

Mr. Cuming has selected two varieties of this shell, but they are not of sufficient importance to require especial notice.

BUCCINUM ELEGANS. *Bucc. testâ ovato-conicâ, acuminatâ, ubique subtilissimè nodulosâ et liratâ, interdum longitudinaliter leviter costatâ; luteo-albâ, columellâ, labro, et canali vividè aurantiis; aperturâ subquadrato-ovali, fauce valdè striatâ; columellâ paululùm excavatâ, labro serrato.*

Reeve, Conch. Syst., vol. ii. pl. 268. f. 3.

Long. $1\frac{1}{2}$; diam. $\frac{3}{4}$ poll.

Hab. California.

This very beautiful and distinct species may be easily recognised by its bright orange mouth. The entire surface of the shell is very finely nodulated.

BUCCINUM PYROSTOMA. *Bucc. testâ ovato-conicâ, lacteâ, ubique cancellatâ, anfractibus convexis, ultimo paululùm umbilicato; aperturâ ovatâ, fauce striatâ, vividè rubrâ.*

Reeve, Conch. Syst., vol. ii. pl. 268. f. 1.

Long. $\frac{3}{4}$; diam. $\frac{3}{8}$ poll.

Hab. —— ?

A small species belonging to the genus *Phos* of De Montford, remarkable from having a deep cornelian red mouth, whilst every other part of the shell is milk-white.

EBURNA JAPONICA. *Eburn. testâ ovato-conicâ, apice vix acuto, lævi; anfractibus convexis, maculis fulvis, grandibus, regularibus, biseriatim cinctis, interstitiis maculis parvis regularibus, diagonaliter dispositis, ornatis; umbilico parvo, profundo.*

Reeve, Conch. Syst., vol. ii. pl. 271. f. 1.

Long. $2\frac{1}{4}$; diam. $1\frac{1}{4}$ poll.

Hab. ad oras Japoniæ; Siebold.

This shell is distinguished by the great regularity of the spots; the upper and middle portions of the whorls are encircled with a band of large rhomboidal spots, whilst the spaces below and between them are filled with small triangular-like spots, arranged across in regular diagonal rows.

TEREBRA PRETIOSA. *Ter. testâ longissimo-subulatâ, luteolâ, fusco partim tessellatâ; anfractibus tricenis, supernè lævibus, uniseriatim serratis, infrà arcuato-striatis, striis numerosis, profundis; canali subflexuoso.*

Reeve, Conch. Syst., vol. ii. pl. 274. f. 2.

Long. $5\frac{9}{16}$; diam. $\frac{1}{2}$ poll.

Hab. —— ?

This extraordinary shell, consisting of thirty whorls, exceeds five inches and a half in length, whilst it barely exceeds half an inch in breadth at the broadest part. It is I believe unique, in the collection of the Rev. Mr. Stainforth.

MISCELLANEOUS.

On the Phosphorescence of the Lampyris Italica.—(*Extract from a letter of M. Matteucci to M. Dumas.*)

Baths of Lucca, Aug. 1, 1843.

1. The phosphorescence of a glow-worm may cease before the death of the insect.

2. In the glow-worm there is a substance, which, without any sensible heat, diffuses a light that does not require the integrity of the animal and of its living state, in order to manifest itself with its peculiar properties.

3. Carbonic acid and hydrogen are media in which the phosphorescent matter of the glow-worm leaves off shining after thirty or forty minutes, if the gases are pure.

4. In oxygen the light of the phosphorescent matter is decidedly more vivid than in atmospheric air, and it remains bright nearly

three times as long: this is as much the case with regard to the separate luminous segments as for the entire worm.

5. When this phosphorescent matter shines in oxygen or in the air it consumes a portion of oxygen, the place of which is supplied by the corresponding volume of carbonic acid.

6. This same substance, in contact with oxygen, but having lost the power of diffusing light, does not sensibly absorb oxygen, and does not develope carbonic acid.

7. Oxygen, mixed with hydrogen or with carbonic acid in the proportion of 1 to 9, forms a medium in which the phosphorescence continues for several hours; we may then conclude that it is by the alteration which has taken place in the phosphorescent substance that this leaves off shining after several days, having at first been put into pure oxygen, the place of a portion of which was afterwards supplied by carbonic acid. I analysed the hydrogen in which I had kept several glow-worms for four-and-twenty hours; the insects had shone but a few minutes: this is the case if the gas is pure, if we operate over mercury, and if care be taken in filling the bell-glass to turn it over two or three times in order to remove the air which adheres to the glow-worms. In this hydrogen gas I found that the volume had increased by a small quantity, and in treating with potash I ascertained that this excess was owing to carbonic acid furnished by the glow-worms; and this took place either because there was a residue of oxygen in their trachea which had combined with the carbon and changed into carbonic acid, or because the insects contained this acid already formed; when only the luminous segments are put into hydrogen, with precaution, they continue to shine but for a few seconds, and the gas undergoes no change.

8. Heat, up to certain degrees, increases the light of the phosphorescent matter; the contrary takes place from cold.

9. When the heat is too great the phosphorescent substance is altered, and the same takes place with this substance when exposed to the air or to some gases for a certain time; it is necessary, however, that it should be separate from the animal.

10. This phosphorescent matter thus altered is no longer capable of giving light or of becoming luminous. These conclusions evidently establish the nature of the phænomenon; the production of the light in this insect is altogether dependent on the combination of the oxygen with the carbon, which is one of the elements of the phosphorescent matter. Now it is important to inquire how the phosphorescence takes place in the living animal; what circumstances cause it to vary; and what is the structure of the phosphorescent substance and of the parts which surround it.—*Comptes Rendus*, Aug. 14.

OBSERVATIONS ON DR. MARTIN BARRY'S MEMOIR ON FIBRE. BY PROF. MOHL.

It has already happened to several microscopic observers, that they have fancied they saw in their investigations the most minute parts of organized bodies, and have imagined that they had detected primitive formations in the form of fibres, globules, &c., and then wherever they looked they again found them, and consequently gave

drawings of things which exist only in their phantasy. These persons are evidently in a situation similar to that of an acquaintance of mine, director of some iron-works, who had once occupied himself a long while in making damask steel, and during this time wherever he looked he fancied he could perceive curved lines similar to those which occur on that steel. But certainly no one has ever yet been so dreamy as the author of the memoir bearing the above title, which relates it is true to animal fibre, but also enters into the structure of plants; for in all organic substances he saw nothing but fibres, which sometimes had a spiral, sometimes a circular, sometimes a longitudinal position; but he moreover observed in these fibres a very complicated structure, viz. their being composed of adjacent spiral fibres with an opposite direction of the spiral, and with the convolutions fitting into each other, so that the figures which the author has given of these fibres are no bad representations of the knot of plaited hair on a woman's head. As the committee who decide upon the admission of the memoirs into the 'Philosophical Transactions' have to attend not only to the importance but also to the "*singularity of the subjects*," the publication of the memoir in question will appear perfectly justified.—*Botanische Zeitung.*

METEOROLOGICAL OBSERVATIONS FOR SEPT. 1843.

Chiswick.—Sept. 1. Foggy: sultry. 2, 3. Slight haze: sultry. 4. Clear and fine. 5. Heavy dew: clear. 6. Cloudless. 7. Slight haze: cloudless and hot. 8, 9. Very fine. 10. Foggy: heavy thunder-showers. 11. Very fine. 12. Overcast. 13. Clear and fine. 14. Overcast. 15—20. Exceedingly fine. 21. Foggy: very fine. 22, 23. Clear and fine. 24, 25. Overcast. 26. Fine: clear and cool. 27. Cloudy and cool: clear, with slight frost at night. 28. Very clear: overcast. 29. Cold and dry: overcast. 30. Rain.—Mean temperature of the month 3°·81 above the average.

Boston.—Sept. 1—6. Fine. 7. Fine: quarter-past 2 P.M. heat 77°. 8. Foggy. 9. Cloudy. 10. Fine: rain P.M. 11, 12. Cloudy. 13—15. Fine. 16. Cloudy. 17—19. Fine. 20. Cloudy: rain early A.M. 21, 22. Fine. 23, 24. Foggy. 25. Cloudy: rain A.M. 26. Windy. 27. Cloudy. 28. Windy. 29. Cloudy. 30. Cloudy: rain early A.M.

Sandwick Manse, Orkney.—Sept. 1. Clear. 2. Cloudy: showers. 3. Showers. 4. Showers: cloudy. 5. Damp: drizzle. 6. Damp: fine. 7—9. Clear: hot: fine. 10. Damp. 11. Haze: fog. 12. Fine. 13. Haze: clear. 14. Clear. 15. Clear: cloudy. 16. Clear. 17. Cloudy: fine: damp. 18. Showers. 19. Clear: aurora. 20. Rain. 21. Showers: cloudy. 22. Cloudy. 23. Damp: drizzle. 24. Drizzle. 25. Showers: drizzle. 26. Bright: cloudy: aurora. 27. Showers. 28. Showers: cloudy. 29. Rain. 30. Cloudy: rain.

Applegarth Manse, Dumfries-shire.—Sept. 1. Fair and fine: one slight shower. 2. Fair and fine. 3. Showery. 4, 5. Fine harvest-day. 6. Fine harvest-day: one slight shower. 7. Fine harvest-day: fair. 8, 9. Fine harvest-days. 10. Fine harvest-day, but cloudy. 11. Fine: shower early A.M. 12, 13. Fine harvest-days. 14. Fine harvest-day: thunder. 15. Fine harvest-day. 16. Fine harvest-day: sheet lightning. 17. Showery. 18. Fair and fine: thunder. 19. Fair and fine. 20—24. Fine harvest-day. 25. Fine harvest-days: hoar-frost. 26. Fine harvest-day: no frost. 27. Fine harvest-day: hoar-frost. 28. Dull: wet evening. 29. Cloudy: rain. 30. Cloudy.

Sun shone out 28 days. Rain fell 7 days. Thunder 2 days. Hoar-frost 2 days.

Calm 14 days. Moderate 9 days. Brisk 4 days. Strong breeze 3 days.

Mean temperature of the month .... 56°·3

Meteorological Observations made at the Apartments of the Royal Society, LONDON, *by the Assistant Secretary*, Mr. Roberton; *by* Mr. Thompson *at the Garden of the Horticultural Society at* CHISWICK, *near London; by* Mr. Veall, *at* BOSTON; *by the* Rev. W. Dunbar, *at Applegarth Manse*, DUMFRIES-SHIRE; *and by the* Rev. C. Clouston, *at Sandwick Manse*, ORKNEY.

Days of Month. 1843. Sept.	Barometer. London: Roy. Soc. 9 a.m.	Barometer. Chiswick. Max.	Barometer. Chiswick. Min.	Barometer. Boston. 8½ a.m.	Barometer. Dumfries-shire. 9 a.m.	Barometer. Dumfries-shire. 9 p.m.	Barometer. Orkney, Sandwick. 9½ a.m.	Barometer. Orkney, Sandwick. 8½ p.m.	Thermometer. London: R.S. Fahr. 9 a.m.	Thermometer. London: R.S. Self-reg. Mx.	Thermometer. London: R.S. Self-reg. Min.	Thermometer. Chiswick. Max.	Thermometer. Chiswick. Min.	Thermometer. Boston. 8½ a.m.	Thermometer. Dumf.-shire. Max.	Thermometer. Dumf.-shire. Min.	Thermometer. Orkney, Sandwick. 9½ a.m.	Thermometer. Orkney, Sandwick. 8½ p.m.	Wind. London: R.S. 9 a.m.	Wind. Chiswick. 1 p.m.	Wind. Boston.	Wind. Dumfries-shire.	Wind. Orkney, Sandwick.	Rain. London: R.S. 9 a.m.	Rain. Chiswick.	Rain. Boston.	Rain. Dumfries-shire.	Rain. Orkney, Sandwick.	Dew-point. Lond. R.S. 9 a.m.
☽ 1.	30·378	30·284	29·943	29·70	30·19	30·25	30·15	30·22	67·8	73·6	61·3	85	57	66	67½	54	56	52	e.	s.	calm	s.	w.	......	......	......	......	......	63
2.	30·428	30·333	30·117	29·75	30·24	30·24	30·15	30·08	69·7	78·3	64·0	82	54	65	68	58	58½	60	nnw.	n.	w.	ssw.	s.	......	......	......	......	......	65
3.	30·374	30·284	30·200	29·60	30·09	30·11	29·75	29·81	67·5	77·0	62·5	82	57	70	67	59	63	54	nw.	sw.	calm	w.	sw.	......	......	......	......	·29	65
4.	30·356	30·330	30·256	29·64	30·21	30·30	30·05	30·22	62·5	78·7	60·3	75	42	60	60	50½	55	53	w.	n.	nw.	n & w.	sw.	......	......	......	......	·13	60
5.	30·472	30·388	30·312	29·84	30·33	30·25	30·20	30·16	58·7	68·4	55·2	74	45	58·5	67	41½	54	55	n.	n.	calm	s & w.	w.	......	......	......	......	......	52
6.	30·368	30·292	30·251	29·73	30·22	30·20	30·11	30·20	61·3	68·0	54·3	81	50	62	70½	48½	56½	57	n.	nw.	calm	sw.	w.	......	......	......	......	·09	57
7.	30·354	30·270	30·246	29·69	30·21	30·20	30·20	30·23	62·7	73·8	60·3	83	53	66·5	69½	45	63	58	nnw.	s.	calm	sw.	sw.	......	......	......	0·10	......	60
○ 8.	30·354	30·267	30·193	29·70	30·19	30·15	30·25	30·25	66·3	75·6	60·0	78	62	62	75	43½	62	59	e.	e.	calm	sw.	sw.	......	......	......	......	......	63
9.	30·244	30·183	30·086	29·65	30·13	30·07	30·22	30·04	65·3	73·3	63·6	79	55	61	77	48½	69	57	ene.	e.	se.	sw.	s.	......	......	......	......	......	64
10.	30·092	30·022	29·956	29·46	29·99	29·80	30·00	29·93	63·0	74·0	60·2	74	56	66·5	72½	50	57	55	ene.	s.	calm	e.	se.	......	·52	......	......	......	62
11.	30·026	30·075	29·942	29·38	30·04	30·10	30·00	30·10	63·5	73·0	61·0	74	58	64	75½	51	58	57	nw.	w.	calm	e.	se.	·250	......	·18	......	......	61
12.	30·272	30·200	30·183	29·66	30·25	30·24	30·21	30·21	61·5	69·0	59·5	75	51	62	74	54	60½	57½	nne.	ne.	calm	se.	...	......	......	......	......	......	61
13.	30·204	30·133	29·931	29·62	30·20	30·04	30·16	30·05	65·3	73·5	55·4	72	47	63	70½	51½	58½	55	ne.	e.	se.	e.	s.	......	......	......	......	......	61
14.	29·912	29·847	29·826	29·40	29·90	29·88	30·00	30·00	61·5	69·7	54·7	69	62	62	70½	47	56	54	e.	e.	calm	e.	se.	......	·01	......	0·02	......	59
15.	29·888	29·956	29·796	29·33	29·89	29·87	29·98	29·92	68·7	71·3	61·7	76	54	65	74½	55	58	54½	e.	s.	se.	ne.	se.	......	......	......	......	......	63
☾ 16.	30·076	30·053	29·994	29·43	29·90	29·98	29·88	29·86	67·7	73·0	61·0	83	53	67	71½	54	60½	57	e.	s.	calm	ne.	se.	......	......	......	......	......	61
17.	30·216	30·128	30·082	29·54	30·05	30·03	29·96	29·93	68·3	76·7	59·7	84	52	66	69	57	59½	59	ssw.	sw.	calm	s.	s.	......	......	......	......	......	64
18.	30·192	30·148	30·090	29·44	29·93	30·10	29·70	29·94	66·7	78·0	63·0	80	58	65·5	65	52	54½	51	sse.	nw.	calm	s.	sw.	......	·20	......	......	·36	64
19.	30·256	30·163	30·148	29·60	30·19	30·12	30·20	30·12	67·2	74·4	62·7	80	49	65	61½	41	54½	53	n.	ne.	calm	w.	s.	·197	......	......	......	·08	65
20.	30·190	30·107	30·034	29·54	30·00	29·96	29·87	29·79	64·7	74·8	58·3	81	47	65	67	55	56	58	ne.	se.	calm	sw.	s.	......	......	·17	......	·11	62
21.	30·226	30·216	30·131	29·54	30·04	30·20	30·01	30·19	60·8	73·4	57·4	75	50	63	65	57	53	54½	e.	sw.	calm	sw.	nw.	......	......	......	......	·16	61
22.	30·468	30·446	30·363	29·83	30·37	30·43	30·27	30·40	60·2	71·6	57·0	71	48	61	68½	40½	57	55	n.	ne.	calm	sw.	w.	......	......	......	0·03	......	60
● 23.	30·590	30·509	30·460	30·00	30·47	30·46	30·44	30·44	58·8	68·7	54·0	69	45	57	69½	42	57	55	n.	ne.	calm	e.	w.	......	......	......	......	......	59
24.	30·542	30·467	30·347	29·92	30·42	30·36	30·31	30·31	59·0	66·4	56·2	66	45	53	61	50	56	49½	n.	nw.	wnw.	nw.	w.	......	......	......	......	·03	59
25.	30·316	30·259	30·161	29·76	30·22	30·22	30·27	30·23	55·3	64·2	52·3	65	41	57	59	48	44½	44	s.	nw.	nw.	nw.	nw.	......	......	......	......	·04	57
26.	30·186	30·064	29·947	29·63	30·13	29·90	30·11	29·92	52·3	65·2	46·6	60	38	50	56½	32	47	44½	n.	nw.	nw.	n.	nw.	......	......	·05	......	·06	52
27.	29·806	29·781	29·681	29·27	29·74	29·73	29·81	29·82	49·2	57·0	44·6	55	32	47	54	41½	44½	43	w.	nw.	nw.	n.	n.	......	......	......	......	·13	49
28.	29·770	29·834	29·735	29·32	29·78	29·83	29·82	29·88	47·5	54·0	41·8	59	34	45	56½	35½	45	46	nw.	nw.	nw.	n.	nw.	......	......	......	......	·07	42
29.	30·004	29·968	29·937	29·50	29·85	29·75	29·80	29·50	48·3	56·2	41·4	62	47	46	53	30½	50½	51	w.	nw.	nw.	n.	nw.	......	·24	......	0·04	·24	43
☽ 30.	29·814	29·893	29·788	29·16	29·79	29·75	29·61	29·51	55·8	57·0	49·3	68	55	56	61	48	51½	51	wsw.	w.	w.	sw.	n.	·238	·01	·07	......	·21	48
Mean.	30·212	30·162	30·071	29·58	30·098	30·084	30·049	30·042	61·6	70·3	56·6	73·90	49·90	60·5	66·5	46·7	55·86	53·65						Sum. ·685	0·98	0·47	0·19	2·00	Mean. 59

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XLVI.—*General results of Microscopic Inquiries into the Minute Structure of the Skeletons of Mollusca, Crustacea and Echinodermata.* By WILLIAM B. CARPENTER, M.D.*

[With two Plates.]

HAVING been engaged, during the last eighteen months, in microscopic researches into the skeletons or hard parts of animals, and having had my attention particularly directed towards the shells of Mollusca and Crustacea, and to the shells, spines, stems, &c. of the Echinodermata, I have been led to believe that a short *résumé* of the results at which I have arrived, would be interesting to the members of the Geological Section of the British Association, and might prove of importance in giving a stimulus to further inquiry. Were it not, indeed, in the hope that the advance of science might be promoted by my bringing forward these results in their present form, I should have hesitated in doing so, until they had attained more completeness. I shall commence with the Mollusca, as presenting the greatest number of points of interest.

Mollusca.

The first point on which I desire to lay stress, is the complete distinctness of the organic basis of the shells of Mollusca from the calcareous portion. The two are not uniformly diffused through the shell, as some have supposed, but are separate elements, each having its own place. The organic or animal basis presents very definite characters, by which its nature may be determined, when the calcareous portion has been removed by the action of an acid.

I also think it desirable to state, *in limine*, that the structure of all shells appears to me to be equally *crystalline*; the carbonate of lime uniformly presenting a crystalline *arrangement*, if not a regular form. I cannot admit, therefore, the distinction between the *crystalline* and *concretionary* shells which Mr. Gray has attempted to establish; nor can I recognise the two forms of cry-

* Read to the Geological Section of the British Association, August 1843; and communicated by the Author.

stallization, the *rhomboidal* and *prismatic,* as characterizing different groups, for reasons which will appear in the course of this paper. The *crystalline aggregation* of the particles of calcareous matter in shell appears to me to be proved by the transparency of thin sections (except where patches of uncrystallized or chalky matter sometimes present themselves), and by their effects upon polarized light. It is very evident in some few instances, in which a distinct crystalline *form* is presented. One of the most remarkable of these is the tooth of *Mya arenaria,* a section of which presents the remarkable appearance shown in fig. 8 (Plate XIV.), bearing a strong resemblance to that of Wavellite or radiating Arragonite. I have found distinct rhomboidal crystals in certain imperfectly calcified layers, which occasionally present themselves in *Ostrea edulis;* and similar crystalline deposits have been described as existing in the dense integument of some Ascidians.

The first distinction established by the microscope, between the different forms of shell-structure, has reference to the nature of their organic basis. This, in most shells, consists but of a simple *membrane,* of extreme tenuity, and not presenting the slightest trace of *structure,* even when examined under the highest magnifying powers. This membrane is obviously analogous to the *basement membrane* lately described by Mr. Bowman ('Cyclopædia of Anatomy and Physiology,' art. *Mucous Membrane*) as existing between what is commonly termed the *true skin* and the overlying *epidermis,* and also between the ordinary mucous membrane and its epithelium; and I am inclined to believe that it originally holds the same position on the mantle of the mollusk, and that it is cast off with each new layer of shell. We shall presently have to notice the remarkable variations, in the microscopic appearance of sections of shell, which are produced by the differences in the manner in which this membrane is arranged. It may be easily obtained by submitting the *internal* layer of any shell (whether nacreous or not) to the action of dilute muriatic acid, until all the calcareous matter has been removed. In the porcellanous shells it is so extremely delicate, that, when thus separated, it is liable to be overlooked; and it seems to be dissolved by the acid, if left in it for too long a time, or if the acid be too strong.

In certain bivalve shells, however, an entirely different kind of membranous basis remains behind, after the calcareous matter has been removed by acid. This consists of a stratum of *prismatic cells,* adherent together at their sides, and forming by their extremities the two surfaces of the membrane, which thus presents the appearance of a honey-comb. This is most characteristically seen in *Pinna;* nearly the whole of which shell is formed of this *prismatic cellular* substance, as may be easily shown by examining

the thin laminæ into which it separates, without any preparation, by the aid of even an ordinary microscope. These cells are usually hexagonal in form, but are not very regularly so. Their size varies considerably, both as to diameter and length, even in the same shell. When very long, the layer which they form will possess considerable thickness; when they are very short, it will be delicately thin. The cells are usually the longest in the outer layers. I have seen a recent *Pinna* in which one of these was nearly $\frac{1}{6}$th of an inch in thickness; and I have seen this far surpassed in fossil shells allied to this genus, as *Inoceramus, Pachymya,* &c.; yet in the very same shells, the inner layers were thinner than a sheet of writing-paper. Although there are considerable variations in the diameter of the cells, in different parts of the same individual, and still more in different species of the same genus, yet there appear to be certain limits; so that some shells may be characterized by the coarseness of their prismatic structure, and others by its fineness. The *coarsest* I have yet met with is in *Inoceramus,* the *finest* in *Pandora*; and the difference is so great, that at least 250 cells of the latter would be covered by one cell of the former (Plate XIII. figs. 1 and 2).

The resemblance, in their structure and position, between the prismatic cellular substance of shells, and the prismatic epithelium covering the mucous membranes of higher animals, leaves no room for doubt of their analogy; and we may consider this form of shell-structure in the light of a *calcified epithelium,* the carbonate of lime being deposited in the cavities of the cells, and in general completely filling them. In most sections of *Pinna* a greater or less number of *dark* cells may be seen, which are usually disposed with some degree of regularity. These I have reason to believe to be cells incompletely filled with carbonate of lime; the spaces remaining in which, being occupied by air only, present a dark appearance under the microscope, according to the general principle well known to observers.

I think it cannot admit of a doubt, that the prismatic arrangement of the carbonate of lime in these shells is due to the nature of the organic basis in which it is deposited, and not to anything peculiar in its mode of crystallization. An interesting specimen of *Pinna* has lately been brought under my notice by Mr. S. Stutchbury, in which the thick outer layer had become disintegrated, during the life of the animal, by the decay of its organic structure; and the prisms of carbonate of lime were left *in situ,* but not in any way held together, so that they could be separated by a touch. On treating these prisms with dilute acid, I find them encircled by an extremely delicate membranous film; the remainder of the cells, in which they were originally formed, having been removed by decay.

It is not difficult for a person who has once become familiar with the appearance of this structure, to recognise it by the naked eye, when it presents itself in any considerable amount. It is known by its brownish-yellow colour, its elasticity (which is greater, and its brittleness less, than that of other kinds of shell-structure), and its prismatic or fibrous fracture. I have determined its existence, by thin sections examined with the microscope, in the following recent genera: *Pinna, Avicula* (*Meleagrina*), *Perna, Malleus* and *Crenatula,* belonging to the family *Margaritaceæ*; *Ostrea* and *Etheria,* which seem to be nearly related, if not to be included in the same family *Ostraceæ*; *Unio* and *Anodon,* belonging to the *Nayadeæ*; and *Pandora.* This last genus is the only exception I have met with to the general rule,—that the prismatic cellular structure is restricted to the group, of which the *Margaritaceæ* may be taken as the type or centre, the lobes of the mantle being almost or completely open and the foot small; and *Pandora* is altogether so anomalous a genus, that the systematist is greatly perplexed by it on other grounds than this.

The position of *Pinna* among the *Margaritaceæ* (of which it may be considered an aberrant form leading to the *Mytilaceæ*), the alliance of *Etheria* to this group rather than to the *Chamaceæ,* and the separation of the true *Ostraceæ* from the *Pectinidæ* on the one hand and from the *Placunidæ* on the other, which had been proposed by systematists on the ground of general characters, appear to me fully borne out, and indeed absolutely required, by the characters afforded by the structure of the shell.

I have examined several fossil shells which exhibit similar characters; such as fossil *Pinnæ, Inoceramus, Pachymya* and *Gervillia,* belonging to the *Margaritaceæ*; *Gryphæa* to the *Ostraceæ*; as well as *Unios,* &c. The prismatic cellular structure is extremely well preserved in nearly all fossil shells; and is very easily recognised, either by fracturing the shell or by making a thin section of it. The latter is necessary where it forms but a thin layer, as in *Gryphæa, Unio,* &c.; the former is sufficient where the layer is thick enough to give the fibrous aspect on fracture.

The determination which the use of the microscope thus enables us to make, of the family to which shells must be referred whose position would be otherwise doubtful, must be, I imagine, of very great use to the geologist, even were that use limited to the few families I have yet named, which is by no means the case. The following will serve as a good example. A certain shell from the lias has been described and figured by Prof. Phillips under the name of *Avicula cygnipes*; and the same or a closely allied species by Mr. S. Stutchbury, under the name of *Avicula longicostata.* These gentlemen were not unaware of its affinity to the *Pectinidæ,* but thought that the characters of *Avicula* predomi-

nated. On examining a portion of it, however, which Mr. Stutchbury submitted to me, I was able most decidedly to assert, that it possessed the intimate structure of the shell of the *Pectinidæ,* whilst the prismatic cellular structure and nacreous lining of *Avicula* were altogether wanting.

The prismatic cellular structure always occupies the *exterior* of the shells in which it occurs; and their inner surface, as well as the whole thickness of a large number of shells, is formed of *membranous* shell-structure, by which I designate that structure which seems to consist of alternating layers of carbonate of lime and of the very delicate membrane already described. This membrane is seldom or never *flat,* however, but is folded into plications like those of a frill, or corrugated into wrinkles like those on morocco leather, or arranged in other ways which cannot at present be fully described, but which are characteristic of particular families. These modes of arrangement determine the mode in which the carbonate of lime is deposited, so that they become perfectly evident when a thin section of a membranous shell is examined with a microscope; and they also determine the appearance produced on fracture. Thus Mr. Gray has pointed out the alternating directions of the rhomboidal crystals seen on fracturing a porcellanous shell, such as *Conus* or *Cypræa*; and these I believe to be entirely due to the alternating directions of the membranous corrugations, which are shown by a section. In like manner, the prismatic fibrous appearance, which is presented by *Mytilus,* and by *Septaria* (*Teredo*) *gigantea,* on fracture, is due to the peculiarity in the form and direction of the plications of the membranous basis; and the microscopic appearance of the latter corresponds so precisely with that, which is to be seen in well-preserved specimens of the fibro-calcareous sheath of the *Belemnite,* that I cannot but regard the structure of this interesting fossil as completely analogous to that presented by the thick tube of the recent *Septaria.*

There are two varieties of the membranous shell-structure, which are produced by marked peculiarities in the arrangement of its organic base; and which are so easily recognised by the microscope, as to become of great use in determining the characters of fossil shells. The first of these exists in *nacre.* That the nacreous lustre is due to lines or striæ, occurring within certain distances from each other, was long ago shown by Sir D. Brewster; but my inquiries into the constitution of nacre have led me to a view of their cause somewhat different from his. Instead of regarding them as produced by the alternation of numerous layers of membrane and calcareous matter, I have ascertained that they are due to the plication or folding of a single layer, in such a mode that the folds shall lie over one another in an imbricated

manner (fig. 3). The edge of each fold therefore marks a line; and the distance of the lines from each other will greatly depend upon whether the cutting-plane coincides with the plane of the folds, or is more or less inclined to them. As the curvature of the layers of shell causes the cutting-plane to traverse them differently in different parts, a single slice of nacre will often show great varieties in the disposition of the lines; just as the same deal board shows the woody layers very differently divided in its different portions.

The view I have given of the structure of nacre is fully proved, I conceive, by the following fact. It is occasionally possible to obtain a single layer of nacre, the *membrane* of which, after the complete removal of the calcareous matter by acid, exhibits the true nacreous lustre, so long as the arrangement of its folds remains undisturbed; but as soon as the membrane is extended, so as to obliterate the folds, the nacreous lustre departs.

I have found approaches to the nacreous structure in many shells, in which the folds are not sufficiently regular for the characteristic lustre to be exhibited. It is easy to understand, therefore, why there should be a variation in this respect, within the limits of a single genus. Thus in *Ostrea* there is usually no perfect nacre, yet there are species which are truly nacreous. On the other hand, in *Mytilus* there is usually a truly nacreous interior, yet there are species in which this is wanting. When so very slight a difference in the arrangement of the folds will produce this variation, it is not surprising that it should occur among the species of the same genus.

The nacreous and even the subnacreous structure may be easily recognised by the microscope, wherever they occur, both in the recent and fossil state. It sometimes requires a microscope of very good defining power, however, to separate the lines. As it frequently happens that a nacreous *structure* is thus shown to exist in fossil shells, where, from some peculiarity in the fossilization, the characteristic *lustre* does not present itself, I should imagine that this microscopic character must frequently be of great importance to the geologist. The absence of any vestige of it was one of the grounds on which I felt justified in determining that the so-called *Avicula*, just now mentioned, could not belong to that genus.

The other peculiar form of plicated membranous structure is that which presents itself in *Terebratula* and other allied genera of the group of Brachiopoda. It is difficult to give, in words, a description of this peculiarity, but it will be at once understood by reference to figs. 6 and 7, Plate XIV.; and, when once seen, is always recognisable with facility. The best mode of showing this peculiar structure I have found to be, the detaching very thin

shreds with the point of a pen-knife; this is very easily accomplished in many fossil species, especially those deeply plicated ones which are usually ranked among the *Terebratulæ,* and best, among recent species, in the *Terebratula psittacea.* It is by the appearances exhibited by these *natural laminæ* (fig. 7), that those presented by artificial sections (fig. 6) must be interpreted. This kind of structure is to be seen in *Terebratula, Spirifer* and *Pentamerus.* In *Producta* there is a difference in the mode of plication, which takes on the *nacreous* character; and it is interesting to remark, that whilst, in the structure of this shell, there is an approach towards the Lamellibranchiata, there is, among the *Placunidæ* (which probably, of all Lamellibranchiata, approach nearest to the Brachiopods), a manifest tendency, in the peculiar lamination of the shell and in the arrangement of the nacreous plications, to the characteristic structure of *Terebratula,* &c.

One of the most interesting points in the structure of *Terebratula,* or, at least, in certain species of it, is the existence of a large number of tubular perforations, passing directly from one surface of the shell to the other, and terminating by an orifice at each (fig. 6). The size of these perforations is sufficiently great to enable them to be detected with a hand magnifier, as minute punctations on the surface; and in this manner I have observed them in all the recent species of *Terebratula* (about fourteen) which have come under my notice, except in the *Ter. psittacea,* which departs so widely from the general type, in the incompleteness of the passage for the ligament, that (as Mr. S. Stutchbury has suggested to me) it is probably to be considered as the recent type of *Spirifer* *. Of the very numerous fossil species of *Terebratula,* I have yet examined but a small proportion: yet the curious result has uniformly presented itself, that the perforations have invariably been found in the non-plicated or moderately plicated species; whilst they have been absent in those which differ from the recent species, in being much more deeply plicated. Now the structure of the shell in the genus *Spirifer* agrees with that of *Terebratula* in every respect, save the absence of these perforations †; I should therefore be inclined, from this character alone, to place *Ter. psittacea* in the genus *Spirifer,* and to refer to the same group those deeply-plicated species, which are usually ranked with *Terebratula.* Whether this be thought a correct

* I have since learned that this species has been separated, and made the type of a new genus, *Atrypa.*

† This statement applies only to the Spirifers of the carboniferous limestone; for in the *Spirifer Walcotii* of the lias, which I have recently examined, the perforations are present, as in the true *Terebratulæ.* The whole subject will require very careful investigation before any legitimate conclusions can be drawn from this kind of examination, in a group of the value of whose several characters we at present know so little.

determination or not, I think no doubt can be entertained, that the presence or absence of these perforations affords a most important character, by which the genus *Terebratula* may be divided. I should mention, that the determination of this character cannot be certainly effected, in fossil species, without making a section of the shell; since the perforations are often filled up with stony matter, in such a way as to obliterate the punctations on the surface.

The diameter of these perforations in *Terebratula* is usually about ·0006 or ·0008 of an inch. In *Producta* they are larger, being about ·0010 or ·0012 of an inch; and they are readily discernible with the naked eye in thin sections or in fractured pieces of the latter. They are readily distinguishable in the decalcified membranous basis of the recent species, and are obviously lined by distinct membranous tubes. I am much inclined to believe that these tubes are prolongations of the mantle, which Mr. Owen has observed to possess an unusual adhesion to the shell.

I cannot but think that the value of the microscope, as an instrument of geological research, must be at once evident from these statements. The genera *Terebratula*, *Spirifer* and *Producta** may be at once distinguished from each other, and from all other shells, by the characters supplied by a fragment of shell, which a pin's head would cover.

Whilst upon the structure of the Brachiopoda, I may mention (though rather anticipating my next head), that the genera *Lingula* and *Discina* (*Orbicula*) agree with each other, and differ entirely from the rest, in a very peculiar set of characters:—their shells possess extremely little calcareous matter, being made up of thin horny plates adherent to each other; every one of these horny plates, however, is traversed by a set of very minute tubuli running aslant through it, and very closely resembling, both in size and arrangement, the tubuli of *dentine*, and those which I have observed in the shell of Crustacea. I have nowhere else discovered, among Mollusca, a structure which could be mistaken for this. Consequently these two genera are at once separated, by microscopic examination, from all others.

The *tubular* variety of membranous shell-structure, as it exists in the shells of certain Lamellibranchiata and Gasteropoda, is the last form which I have at present to describe. The size of these tubuli varies from about 1-20,000th to 1-3500th of an inch; but their general diameter, in the shells in which they most abound, is about 1-6000th of an inch. The direction and distribution of these tubes are extremely various in different shells. In general they form a network which spreads itself out in each layer, nearly

* If I am correct in the characters I have assigned to them.

parallel to its surface; from this network branches seem to pass both upwards and downwards, as if to communicate with corresponding reticulations in other layers. The most characteristic example of this kind which I have met with, is in the genus *Lima*, of which the whole shell is minutely traversed by these reticulated tubes (fig. 5). In most families whose shells are entirely *membranous* (that is, destitute of the prismatic *cellular* structure), I find the tubular structure present in some genera and absent in others; so that I am inclined to think that it may serve as an important aid, in separating genera which are otherwise closely allied.

The tubular structure is often well preserved in fossil shells, and is distinctly seen in the *Avicula longicostata* already referred to. As this example is one of peculiar interest, in regard to the value of the microscope in determining the nature of fossil shells, I subjoin a summary of the characters by which I judge it to be *not* an *Avicula*, but nearly allied to *Lima* or *Plagiostoma*.

Avicula, and other Margaritaceæ.	*Avicula (?) longicostata.*		*Lima, Plagiostoma, and allied Pectinidæ.*
External layer.	*External layer.*	*External layer.*	*External layer.*
Prismatic cellular structure.	No cellular structure.	Coarsely plicated membranous structure.	Coarsely plicated membranous structure.
Internal layer.	*Internal layer.*	*Internal layer.*	*Internal layer.*
Nacreous.	Not nacreous.	Tubular structure.	Tubular structure.

It is worth notice, that in the genus *Pecten* there is not the slightest trace of the tubular structure, whilst the shell of *Lima* is more completely tubular than any I have examined. Hence we might consider the difference between them to be more than *generic*; a conclusion which harmonizes exactly with that of M. Deshayes, founded upon the structure and habits of the animals by which these shells are respectively formed.

The foregoing may be regarded as *specimens* of the important results which I think may be anticipated, from the application of the microscope to the structure of shells. When once marked differences in the arrangement of the organic elements of shell are shown to exist, the question naturally arises, how far these may be adopted as characters in classification; and I think it will be evident, from the facts I have stated, that this may be done to a very considerable extent. There are several families among which I have not yet discovered well-marked points of difference, especially in Univalve shells, and in Lamellibranchiata with the lobes of the mantle united; but I have little doubt that such characters may be ascertained, by a more extended inquiry than I have yet had the opportunity of making. Except in the case

of *Pandora*, to which I have already adverted, I have not met with a single exception to the rule,—that marked differences in the structure of shell go along with marked differences in general characters, and that a close correspondence in the structure of the shell may be held to indicate a tolerably close natural affinity. Many circumstances which at first appeared to me *exceptional*, were explained in the course of my investigations, by my finding (chiefly from the *notes* of M. Deshayes to the new edition of Lamarck) that the views of systematists had recently undergone modification, on several points, from increased knowledge of the structure of the animals, *so as, in fact, to become precisely accordant with the inferences which I should have been disposed to draw from the structure of the shell alone.*

In concluding this part of my subject, it may be interesting to my geological auditors, if I say something in regard to the effects of *fossilization* under different circumstances, on the structure of shell. The fossil shells I have examined have been chiefly from the carboniferous or mountain-limestone, lias, and oolite. Those from the carboniferous limestone are frequently changed by a process of crystallization, to such a degree that no organic structure is discernible in them; but the characteristic structure of the Brachiopoda is usually well preserved. The *membranous* shells of the *lias* are usually well adapted for microscopic inquiry; but they split with unusual facility into layers, as if they had undergone very prolonged maceration. The *cellular* shells, from the same cause, are disposed to disintegrate into their component prisms, so that it is difficult to prepare them for the microscope. On the other hand, the *membranous* shells of the oolite are apt to be entirely changed by crystallization, so that not a trace of the organic structure is preserved; whilst the structure of the *cellular* shells is remarkably perfect, and even the membrane which separates the prisms is in some instances preserved. I have not found shells from the *chalk* good subjects for microscopic examination: their texture seems to be permeated by chalky particles, which give it a peculiar opacity, resembling that which is seen, from the same cause (occurring in the natural formation of the shell), in *Ostrea*, *Fusus despectus*, and other shells distinguished by their opake-white aspect.

Crustacea.

In regard to the microscopic structure of the hard envelopes of Crustacea, I can as yet only speak from examination of the common Crab and Lobster; but the facts which this examination has disclosed are so curious, as to render it desirable to state them in this communication.

The envelope of the crab and lobster consists of three layers:

internally a thick calcareous layer, the surface of which is raised up in little papillary elevations; upon this lies a layer of *pigment-cells,* to which the colour is due; and externally is a structureless horny epidermis. The pigment-cells fill up the valleys or intervals between the papillary elevations of the calcareous layer, but do not cover the latter; the epidermis, which is quite smooth, lies flat upon the whole, adhering to the tops of the papillæ; so that, when the shell is closely examined from the outside, it is seen to have a minutely-speckled appearance, the red ground given by the pigment-cells being studded with the white tops of the papillæ which rise up through it.

The calcareous layer is composed of a substance exactly analogous to ivory, being very transparent and apparently homogeneous, when cut into very thin slices, and being perforated by an immense number of minute sinuous tubuli, which run nearly parallel to one another from one surface of the shell to the other. This arrangement may be seen by making a thin section of any part of the shell; but it may be shown particularly well in the end of the claw, which is thicker and of denser texture than the rest. A transverse section of this shows the tubes radiating from the central cavity towards the external surface, and would, I feel assured, be regarded by the most experienced observer as the section of a tooth, if he were not informed of its real nature.

Echinodermata.

The microscopic structure of the shell of *Echinus* has been very completely analysed by Valentin, in his monograph of the anatomy of that genus, published last year in the beautiful work of M. Agassiz on this group. Before becoming acquainted with his researches, I had arrived at conclusions exactly identical, and had extended my inquiries to all the other most important genera of the *Echinida, Stellerida* and *Crinoidea.* The result has been extremely interesting. Every part of the skeleton in these groups is made up of a structure so uniform, and at the same time so unlike everything else, as to be most characteristic of the group; so that there could be no hesitation, wherever the merest fragment of this structure might be distinguishable, in pronouncing it to have belonged to an Echinoderm. I have reason to believe that minute calcareous plates, having an identical structure, occur beneath the integument of some *Holothuridæ*; if this be the case (which, for want of a specimen, I have not yet had the opportunity of ascertaining), the universality of the character, as distinguishing the whole group of *Echinodermata,* will be completely established.

The structure to which I allude consists of a series of very thin plates, each perforated by a number of round apertures,

disposed with tolerable regularity, so as to give it the appearance of a *cullender*. These plates are connected with each other by little vertical pillars, which pass from surface to surface in vast numbers: hence, when a section is made perpendicularly to the surface of the plates, a kind of network is seen, formed by the cut edges of the plates and by the pillars. In the *shells* of *Echinus, Cidaris, Spatangus*, &c. these plates run nearly parallel to the surface, and are of course nearly plane; whilst the pillars are perpendicular to these, so that the interstices of the network are nearly square: but in the *spines* of *Cidaris, Echinus*, &c. the plates are disposed in a cylindrical manner round the central axis, and the network which is displayed by a transverse section is arranged in concentric rings. The *pattern* of this network in many spines is of the most wonderful beauty and elaborateness; and, as far as I have yet examined, it is so regular in the same species and so different in others, that I am inclined to believe that it will become most valuable in the distinction of species.

A similar cylindrical arrangement, producing the same effect, is seen in the stem and arms of the recent *Pentacrinus*, thin sections of which are extremely beautiful objects for the microscope.

Contrary to the expectation of some of my mineralogical friends, I have been able to discover the same structure in fossil specimens, in which the crystallization was so complete, that they could not be cut without great difficulty, on account of their tendency to cleavage. This has been the case with the *Crinoidea* in general; a definite structure being presented by nearly all the specimens that I have yet examined, though it has been more evident in some than in others. The structure of the round-stemmed species is usually very simple; a transverse section exhibiting several concentric rings or layers, like those of exogenous wood, with no variety in the pattern of the reticulation. But in the *Pentacrinites Briareus* the structure is extremely complex. From the centre there proceed five medullary rays (if so they might be designated), from the edges of each of which are given off numerous side-branches; and the reticulations of the central portion and its prolongations are very distinct from those of the periphery. Now in the recent *Pentacrinus Caput Medusæ* the pattern is simpler; for though the medullary rays exist, they do not send out lateral branches, and their structure is not so different from that of the portion that surrounds them. In a fossil species, supposed by Mr. Miller to be identical with the recent one, I have found the structure of the stem to be intermediate between that of the *Pent. Briareus* and that of the *Pent. Caput Medusæ*; the medullary rays sending out *short* prolongations, which soon lose themselves in the surrounding structure. I cannot but suppose, therefore, that analogous differences might

be found among other species of *Pentacrinus*, and that indubitable specific characters (which are much wanted in this genus) might be established upon these.

In conclusion, I desire to make it known, among those who may feel an interest in this inquiry and who may perceive its importance, that I shall feel particularly obliged by being supplied with specimens for examination; that by extending the basis of my inquiries, my general conclusions may acquire a value and stability, which I am conscious that they do not at present possess. Single or imperfect valves of any of the rarer recent genera, and fragments of almost any fossils in which the shelly structure is well preserved, will be gratefully received by me; and I shall do my best to make them available for the purposes of science.

Addendum.

Having been encouraged by the British Association to carry out these investigations, and having been requested to furnish a detailed Report on the Microscopic Structure of Shells, &c. for its next meeting, I am particularly anxious to lose no time in examining as large a number of species, both recent and fossil, as I may be enabled to do, by the kind assistance of those who may be disposed to promote my object. Any contributions of the kind specified above may be forwarded to me direct through the post-office if not too bulky; and Mr. Lovell Reeve, King William Street, Strand, and Mr. Woodward, Geological Society, have kindly undertaken to assist me, by receiving and forwarding to me any specimens that may be transmitted to them.

I may subjoin, as interesting results of observations made since the meeting of the Association, the identification of the remarkable structure of *Pleurorhynchus Hibernicus* (*Cardium Hibernicum*) with that of *Hippurites* and other *Rudistes*; leaving no doubt in my own mind of their close affinity, this structure being, so far as I know at present, peculiar to the last-named group. It has given me great pleasure to learn, that several intelligent conchologists had formed the same opinion on independent grounds; though, so far as I am aware, it has never been put forward in print, and I was entirely ignorant of it at the time my own observations were made. The structure in question is of a *cancellated* nature, filling up the space between the internal and external layers of shell, in the same manner as the *diploe* fills up the space between the two tables of the skull. The *cancelli* are very regular in form and arrangement; and though they are now filled with carbonate of lime, I think its appearance indicates that it is the result of fossilization. I am not acquainted with cancellated structure exactly resembling this in any recent shell; the nearest approach to it is presented by *Balanus, Coro-*

nula, and other sessile Cirrhipods; and I am much inclined to believe that the real place of this perplexing group will prove to be intermediate between the Conchifera and the Cirrhipoda—an idea which has derived confirmation from the examination of the very beautiful series of specimens in the collection of S. P. Pratt, Esq., which it is to be hoped that he will take an opportunity ere long of communicating to the public.

I may state that the specimens most acceptable to me at present are those of the various genera of Brachiopoda; as I am very desirous of fully investigating this group before making my first Report. But I shall be very glad to receive *any* others, provided that the name of the shell is specified, when a fragment only is sent; and the bed from which it is obtained, if it be a fossil.

W. B. C.

Bristol, Nov. 16, 1843.

EXPLANATION OF PLATES XIII. XIV.

Fig. 1. Appearance of the membrane of a thin layer of the outer part of the shell of *Pinna,* taken parallel to the surface, after removal of the calcareous matter by acid.

Fig. 2. Thin section of the outer part of the shell of *Pinna,* not acted on by acid; two small black cells are seen, in which the calcareous matter is deficient.

Fig. 3. Section of Nacre, showing the wavy, but usually parallel lines, produced by the plaiting of the basement membrane.

Fig. 4. Section of *Avicula* (?) *longicostata,* showing its coarsely corrugated structure penetrated by tubes.

Fig. 5. Section of the inner part of the shell of *Lima rudis,* showing a finely corrugated structure abundantly traversed by tubes.

Fig. 6. Section of *Terebratula* (recent), showing its peculiar structure, and the large perforations by which the shell is traversed at right angles to the surface.

Fig. 7. Shred of *Terebratula* (fossil) detached by the point of a knife, from a deeply-plicated specimen; the difference of aspect between this specimen and the last is entirely due (except in regard to the perforations) to the mode in which the section is made; a natural lamina being obtained in the one case, whilst in the other the plane of section traverses the natural laminæ obliquely.

Fig. 8. Section of the tooth of *Mya arenaria,* showing a remarkable crystalline arrangement.

XLVII.—*Description of some New Species of the Genus* Pachyodon. By Capt. Thomas Brown, M.W.S., M.R.P.S., Curator of the Manchester Natural History Society's Museum, &c.

[With three Plates.]

1. *Pachyodon Gerardi.* Pl. XV. figs. 1, 2.

Transversely ovate, inflated, thickness equal to half its breadth; umbones produced, rounded, and contiguous; posterior side short and obliquely truncated; anterior side long and subtrun-

cated; hinge line almost parallel; external surface with a few remote concentric wrinkles or lines of growth.

I found this species in the coal shale at Dalkeith, Mid Lothian.

2. *Pachyodon lateralis*. Pl. XV. fig. 3.

Transversely elongated, subquadrate cuneiform; sides very unequal, the anterior one very long, gradually sloping from the umbones and terminating in an obliquely truncate point; posterior one very short; umbones produced, with acute but not inflected beaks. Length somewhat more than half an inch; breadth nearly an inch and a half.

Coal shale, Whitehaven.

3. *Pachyodon sulcatus*. Pl. XV. figs. 4, 5.

Subtriangular, rather compressed; umbones prominent, very close, slightly reflected, subacute, and placed considerably to one side; general surface smooth, with inequidistant concentric furrows; posterior side arcuated, with a rounded point situate low; anterior side gently rounded; basal line nearly parallel. Length $1\frac{1}{2}$ inch; thickness $\frac{1}{2}$ inch.

Coal shale near Whitehaven.

This species is liable to some variety in external contour.

4. *Pachyodon rugosus*. Pl. XV. figs. 6, 7.

Subtriangular, greatly ventricose in proportion to its size, its depth being equal to five-sixths of its whole length; umbones very prominent, situate considerably to one side, pointing posteriorly and remote from each other; anterior side abruptly descending and rounded; posterior side gradually sloping and considerably more acute than the other; ligament produced; external surface with unequal, rugose, concentric wrinkles. Length $2\frac{5}{8}$ inches; breadth $3\frac{1}{2}$ inches; thickness $2\frac{1}{4}$ inches.

The young shells are much more rugosely wrinkled than the adult.

Found in the ironstone shale at Sheden by Mr. S. Gibson of Hebden Bridge, and in his cabinet.

5. *Pachyodon subrotundus*. Pl. XV. fig. 8.

Subrotund; umbones subcentral, produced, blunt, and somewhat remote from each other; hinge line considerably arcuated; surface with irregular, acute, concentric wrinkles; thickness about equal to half its length.

Coal shale, Oldham.

6. *Pachyodon bipennis*. Pl. XV. fig. 9.

Transversely elongated, somewhat hatchet-shaped; sides unequal; umbones produced and remote; hinge and basal lines

nearly parallel; anterior side short and rounded; posterior side elongate, and obliquely subtruncate from the hinge line, terminating below in a short, slightly acuminated curve; surface rather smooth, with a few, distant, transverse, shallow grooves.

Ironstone shale at Low Moore, Yorkshire.

7. *Pachyodon Dawsoni.* Pl. XV. fig. 10.

Orbicular; umbones central, large, produced and remote; surface nearly smooth, with only a few nearly obsolete concentric wrinkles; thickness equal to more than half its diameter.

Found in the ironstone shale at Low Moore near Bradford, and is in the cabinet of Mr. S. Gibson.

8. *Pachyodon nanus.* Pl. XVI. fig. 1.

Smooth, posterior side elongated and obliquely subtruncate above, subacute below, anterior side rounded; umbones produced and rounded; hinge line arcuated.

Coal shale at Middleton, near Leeds.

9. *Pachyodon Rhindii.* Pl. XVI. fig. 2.

Subacute at both extremities; basal line considerably arcuated, rather produced opposite the umbones; posterior side turned slightly upwards; umbones subcentral, prominent, and very close; hinge line curved; surface with transverse, shallow, irregular wrinkles. Length equal to two-thirds of its breadth.

Coal shale, Polmont, Stirlingshire.

10. *Pachyodon Amygdala.* Pl. XVI. fig. 3.

Inflated, anterior side rounded; posterior side acuminated, with an acute beak-like termination; umbones rather obtuse and remote; basal line considerably arcuated; surface with many irregular acute wrinkles.

Ironstone shale, Low Moore, Yorkshire.

11. *Pachyodon exoletus.* Pl. XVI. fig. 4.

Shell transversely elongate, its breadth about double its length; surface quite smooth; umbones blunt, placed near to the anterior side, which is round; posterior side acuminated and subacute; hinge line slightly arcuated, basal line nearly parallel; thickness somewhat more than half its length.

Ironstone shale, Low Moore, near Bradford.

12. *Pachyodon dubius.* Pl. XVI. fig. 5.

Subovate, both sides rounded; umbones slightly produced and rounded; hinge and basal lines arcuated; surface with nearly obsolete, irregular, concentric wrinkles.

Coal shale near Newcastle-on-Tyne.

13. *Pachyodon subtriangularis.* Pl. XVI. fig. 6.

Subtriangular, rather inflated; umbones very prominent, remote, being nearly a quarter of an inch apart; hinge line almost parallel; basal line with an undulation; both sides rather abruptly sloping; surface smooth, with a slight elevation towards the umbones.

Ironstone shale at Coalbrook Dale.

14. *Pachyodon Smithii.* Pl. XVI. figs. 7, 8.

Subtriangular, rather inflated; umbones subcentral, prominent and rounded, inflected and quite close; anterior side rounded, posterior side subacute; surface with transverse, rather deep irregular wrinkles; breadth about a third more than its length.

Ironstone shale at Sheden.

15. *Pachyodon Embletoni.* Pl. XVI. fig. 9.

Subtriangular, anterior side short and rounded; umbones placed much to one side, obtuse above, beaks inflected and sharp-pointed; hinge line considerably arcuated; posterior side gradually sloping, and terminating in a narrow, subtruncated, rather short beak; surface with transverse irregular wrinkles.

Coal shale at Middleton, near Leeds.

16. *Pachyodon Heyii.* Pl. XVI. fig. 10.

Subtriangular, inflated; anterior side abruptly sloping; posterior side gradually descending, terminating in an oblique subtruncation and slightly beaked; hinge line arcuated, basal line very slightly curved; umbones prominent, but obtuse and quite close at the beaks; surface with many concentric wrinkles; a longitudinal, gradually widening, shallow groove emanates from the umbones and terminates on the basal margin.

Ironstone shale at Sheden.

17. *Pachyodon agrestis.* Pl. XVI. fig. 11.

Subcompressed, transversely elongated; anterior side much rounded, posterior side lengthened and subacute, descending in a nearly parallel line from the umbones, which are very obtuse and remote; on the posterior side a longitudinal, wide, oblique, shallow groove takes its rise on the disc and terminates on the basal margin, below which there is a flexure on the edge; whole surface covered with very coarse transverse wrinkles; thickness $\frac{6}{8}$ths of an inch.

Ironstone shale near Sheden.

18. *Pachyodon similis.* Pl. XVI. fig. 12.

Compressed; anterior side rounded from the umbones, which are hardly produced but very contiguous; posterior side nearly

parallel, obliquely truncate, with a slightly turned-up beak below; hinge line nearly straight, basal line somewhat arcuated; surface irregularly wrinkled transversely.

Coal shale at Middleton, near Leeds.

19. *Pachyodon turgidus.* Pl. XVI. figs. 13, 14.

Inflated; thickness nearly seven-eighths of an inch; breadth an inch and three-eighths; umbones prominent, set a little apart; anterior side short, slightly subtruncate; posterior side nearly parallel above, with a truncated termination; hinge line almost parallel, basal line with a slight flexure; surface with pretty strong irregular wrinkles.

Coal shale at Wakefield.

20. *Pachyodon nucleus.* Pl. XVI.* fig. 1.

Inflated, transversely ovate; umbones subacute and remote; hinge line nearly straight; anterior side a little acute, posterior side elongated and acuminate; basal line subarcuated; surface with shallow transverse wrinkles.

Coal shale at Woodhall, on the north side of the Pentland Hills, near Edinburgh.

21. *Pachyodon Blaydsii.* Pl. XVI.* fig. 2.

Obliquely subtriangular, inflated; umbones prominent and remote; hinge line nearly straight; anterior side parallel above its termination, suddenly rounded; posterior side acuminated, straight above, with an obliquely truncated termination, sharply beaked below; basal line ascending from the point opposite the umbones. Length $\frac{5}{8}$ths of an inch; breadth $\frac{7}{8}$ths; thickness nearly half an inch.

Coal shale at Middleton, near Leeds.

22. *Pachyodon Aldamii.* Pl. XVI.* fig. 3.

Subcompressed, flexuose and subtriangular; umbones subcentral, very obtuse, set $\frac{1}{8}$th of an inch apart; hinge line slightly arcuated; anterior side abruptly descending from the umbones, beneath which it is slightly rounded with a flexure below, somewhat produced on the margin immediately under the umbones; posterior side gently sloping and rounded, with a shallow furrow emanating from below the umbones, and rapidly widening, terminates on the base; basal line flexuose. Length $1\frac{5}{8}$ inch; breadth $2\frac{1}{8}$ inches; thickness 1 inch.

The greatest thickness of the shell is at the middle of the discs, from whence it rapidly becomes thin towards the margins.

Coal shale at Whitehaven.

23. *Pachyodon antiquus.* Pl. XVI.* fig. 4.

Transversely elongated, subcompressed; umbones very obtuse

and remote; anterior side short, nearly straight above, with a cleft termination; posterior side long, with an obliquely subtruncate termination, point below a little rounded; hinge line very slightly arcuated; a pretty deep transverse furrow runs close to and nearly parallel with the superior margin on the posterior side; basal margin with a slight hollow posteriorly; surface with strong transverse wrinkles, and a few irregular, nearly obsolete, longitudinal furrows, producing an antiquated appearance; thickness $\frac{3}{8}$ths of an inch.

Ironstone shale, Low Moore, near Bradford.

24. *Pachyodon transversus.* Pl. XVI.* fig. 5.

Transversely elongated; umbones blunt and obliquely rounded; anterior side short, rounded and slightly produced at the extremity; posterior side long, gradually declining from the umbones, ending in an obliquely truncate termination, rather acutely beaked below; hinge line nearly straight, basal line with a slight flexure posteriorly; surface rather smooth.

Coal shale at Middleton, near Leeds.

25. *Pachyodon hamatus.* Pl. XVI.* fig. 6.

Oblong-ovate, considerably inflated; umbones large, produced and slightly inflected; anterior side rounded, posterior side subacute; hinge line nearly parallel; basal margin a little arcuated; surface with strong concentric wrinkles.

Found by Dr. Fleming in the Oxford clay at Gristhorpe Bay.

26. *Pachyodon vetustus.* Pl. XVI.* fig. 7.

Transversely elongated, compressed; umbones very obtuse and depressed; anterior side short and subacute; posterior side long, broad, and rounded at the extremity; hinge and basal lines very slightly arcuated; external surface with pretty broad, shallow, concentric wrinkles.

Found by Dr. Fleming in the carbonaceous shale at Gristhorpe.

I am strongly inclined to consider this species as belonging to the genus *Alasmodon,* with which it agrees in all its external characters.

27. *Pachyodon levedensis.* Pl. XVI.* fig. 8.

Subtriangular wedge-shaped; umbones rounded, situate considerably to one side; anterior side very short and abruptly descending; posterior side long, acuminated, its superior margin gradually inclining to a truncated termination; basal margin nearly straight; surface with transverse antiquated wrinkles.

Coal shale at Middleton, near Leeds.

28. *Pachyodon pyramidatus.* Pl. XVI.* fig. 9.

Subtriangular cuneiform, somewhat pyramidal; umbones large, contiguous, extremely obtuse; anterior side very short, abruptly descending and rounded below; posterior side elongated, its superior line gradually descending to a blunt acuminated termination, thick on the anterior side, and becoming rapidly compressed posteriorly; base acute, slightly flexuose and thin at the edge; surface with shallow irregular wrinkles; thickness equal to two-thirds its length.

Ironstone shale at Low Moore; also in shale at Woodhall, near Edinburgh.

I am indebted to the following friends for the use of the above specimens:—to Dr. Fleming, Broughton View, Pendleton, Manchester, for Nos. 24 and 25; Thomas Wm. Embleton, Esq., Middleton Hall, near Leeds, for 8, 14, 17, 20, 23 and 26, kindly presented to me; Mr. Samuel Gibson, Hebden Bridge, for 8, 14, 17, 20, 23 and 26; William Rhind, Esq., Surgeon, Edinburgh, for 9 and 19; W. C. Williamson, Esq., Surgeon, Manchester, for 18; and Mr. Robertson, Newcastle-on-Tyne, for No. 12.

XLVIII.—*A Century of new Genera and Species of* Orchidaceous *Plants.* Characterized by Professor Lindley.

[Continued from vol. x. p. 186.]

Decade 2.

11. Masdevallia *minuta*; folio lineari-lanceolato carnoso acuto scapo unifloro duplo breviore, floribus cylindraceis hinc gibbosis, sepalis linearibus acuminatis æqualibus.

Surinam (Hostmann, no. 151).

The whole plant only two inches high, flowers included. Flowers apparently dull orange. Petals bidentate. Lip linear, very slightly unidentate on each side.

12. Stelis *pauciflora*; folio obovato-lanceolato obtuso tridentato in petiolum angustato, spica solitaria nutante folio subæquali, floribus distantibus, bracteis acuminatis, sepalis subrotundis subæqualibus ciliatis intus pilosis, petalis ciliatis labelloque carnosis.

Brazil (Miers).

Leaf about $2\frac{1}{2}$ inches long. Flowers four or five on a raceme, about half an inch apart.

13. Stelis *Miersii*; folio lineari spathulato obtuso plano-convexo emarginato, spicis subsolitariis folio subæqualibus secundis, bracteis ovatis apiculatis, sepalis ovatis supremo minore lateralibus

extus trinerviis, petalis membranaceis subtruncatis, labello ovato acuto.

Brazil (Miers).

Flowers very small, pale straw-colour. Leaves about two inches long. Near *S. spathulata.*

14. Stelis *Serra* ; folio oblongo marginato apiculato basi angustato, spicis subgeminis erectis strictis duplo longioribus, bracteis distichis ovatis acutis internodiis longioribus, sepalis rotundatis, petalis retusis membranaceis, labello membranaceo trilobo.

Peru, in prov. Chachapoyas (Mathews).

Whole plant about three inches high. Flowers a little longer than the bracts, very small.

15. Stelis *flexuosa* ; folio oblongo acute tridentato marginato in petiolum angustato, racemis subgeminis filiformibus flexuosis multifloris 2—3plo longioribus, bracteis minimis ovatis acutis pedicellis brevioribus.

Peru (Mathews, no. 1910).

Leaves about three-quarters of an inch long. Racemes drooping, zigzag ; bracts very minute at the angles of the axis.

16. Pleurothallis *aurea* ; folio sessili oblongo horizontali obtusissimo, racemo stricto solitario 4plo longiore, sepalis lineari-lanceolatis acuminatis intus glanduloso-scabris lateralibus basi tantum connatis, petalis oblongis obtusis carinatis triplo brevioribus, labello obovato apice rotundato lineis duabus flexuosis elevatis, clinandrio lacero.

Caraccas (Linden, no. 634).

The flowers are bright yellow, probably with a little purple streaking. The raceme is nine inches long. The sepals are seven lines long. The habit is that of *P. racemiflora,* to which and *P. pulchella* it is nearly related.

17. Pleurothallis *Lindenii* ; caule nudo folio oblongo-lanceolato acuminato sessili duplo longiore, racemo filiformi solitario pendulo folio breviore, sepalis subdiaphanis acuminatis glabris lateralibus in cochlear connatis, petalis æquilongis acuminatis coriaceis, labello nano cordato acuto.

Caraccas (Linden, no. 630).

Flowers large, apparently violet, about four on the lax solitary raceme. Perhaps this with *P. Mathewsii* and some other long-petaled species may form a good section in this difficult genus.

18. Epidendrum (*Encyclium*) *Lindenii* ; foliis binis oblongis obtusis racemi pedunculo æqualibus, racemo laxo, floribus carnosis, sepalis lanceolatis obtusiusculis, petalis basi angustatis, labelli subrotundi 3-lobi laciniis lateralibus rotundatis, intermedia subcuneata, callo disci tomentoso, clinandrio obtuse 3-dentato, cardinis appendice bidentata.

Caraccas (Linden, no. 624).

Very near *Epidendrum pterocarpum,* but the flowers are larger, and apparently deep rose-colour.

19. Epidendrum (*Spathium*) *refractum*; folio carnoso ovato-oblongo coriaceo obtuso, pedunculo elongato spathis plurimis falcatis obtusis distinctis vaginato, racemo brevi 4—5-floro cernuo, floribus carnosis, sepalis oblongis acutis dorsali refracto, petalis ovalibus subconformibus, labello subrotundo cordato trilobo basi biverrucoso per medium calloso, lacinia intermedia abbreviata truncata.
Caraccas (Linden, no. 618).

A very singular plant, with six or seven herbaceous, equitant, distinct falcate spathes on a peduncle about nine inches long. The sepals are about three-quarters of an inch long.

20. Epidendrum (*Euepidendrum*) *aquaticum*; caule ancipiti ramoso, foliis lineari-oblongis acutis panicula simplici pauciflora (aut racemo) paulo brevioribus, sepalis oblongis petalisque linearibus obtusis, labello carnoso alte cordato cucullato basi ecalloso, clinandrio utrinque bidentato.
Brazil (Gardner, no. 4344); an aquatic.

The branches of this are four or five inches long, the leaves from half an inch to two inches. The flowers small and green.

XLIX.—*On a new species of Marmozette in the British Museum Collection.* By John Edward Gray, Esq., F.R.S.

To Richard Taylor, Esq.

My dear Sir,

Among the new Mammalia recently received by the British Museum is a species of Marmozette, which is very interesting as coming from Mexico, all the species hitherto described having been found in the Brazils. I have named it, from the peculiar colouring of its under side, the Red-bellied Marmozette.

Jacchus rufiventer.

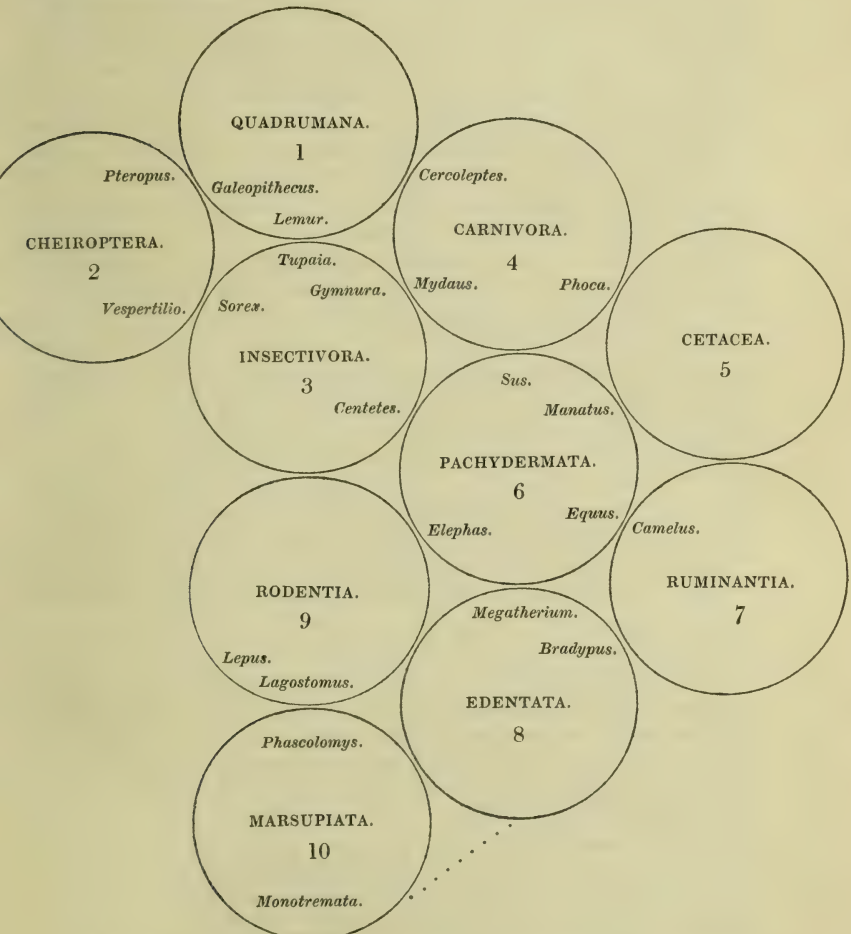
Black, grisled by the white tips of the hair, which are more abundant on the loins and thighs; chest, inner side of the legs, under side of body and spot on the middle of the crown of the head chestnut-brown; tail elongated, black; ears large, not penciled.
Inhab. Mexico.

This species is very distinct in its coloration from any other of the described species. I was at first inclined to regard it as a variety of *Jacchus melanurus*, but that species is described as brown and fulvous beneath, and on comparing the longer description of the species given in Kuhl with our animal, it is evidently distinct.

Yours truly,
John Edward Gray.

L.—*Observations on the Classification of the Mammalia.* By George R. Waterhouse, Esq., Assistant Secretary and Curator to the Zoological Society, &c.

The following observations are chiefly explanatory of the accompanying tabular arrangement, in which I have attempted to group the various orders of the class Mammalia so as to display their mutual relations:



In this table the orders are represented by circles: the numbers in the circles indicate the order of succession in which it appears to me the great groups should follow each other when it is necessary to treat of them as though they formed a linear series*:

* The extensive collection of Mammalia belonging to the Zoological Society was arranged by myself, towards the end of the year 1836, in the

those numbered 1 to 9 inclusive comprise the nine orders of Placental Mammalia; and the lowest circle, 10, represents the Implacental Mammals, which in the structure of their brain, and in their generative and vascular systems, exhibit the lowest grade of organization observable in the class; that is, the most remote from man, and the most approximate to the oviparous classes.

The Placental series appears to divide itself into two great masses or sections, the first or highest of which includes the circles 1 to 4, and the second is represented by the four lower circles, 6 to 9 inclusive. The higher section embraces those species which possess in a well-developed condition the four kinds of teeth, viz. incisors, canines, false molars, and true molars. They are chiefly animals of prey, carnivorous or insectivorous, if we except the highest circle, which contains those mammals which approach in all their characters most nearly to man, and are chiefly frugivorous: here the brain presents at first—that is, in the highest *Quadrumana*—a structure very similar to that of man; but in the lowest *Lemuridæ*, which are always placed at the bottom of the Quadrumanous series, we find the cerebrum comparatively small, the anterior lobes in some*, but little developed and contracted in front, instead of presenting the rounded and expanded condition as in man. The convolutions of the hemispheres are but few in number and very symmetrical. The cerebellum is in a great measure exposed. In the lowest American Monkeys is a structure of brain which may be regarded as intermediate between that observable in the Lemurs and that of the higher *Quadrumana*. Thus in the genus *Midas* the brain is almost destitute of convolutions, but its superiority over that of the Lemurs is evinced in the comparatively great development of the cerebrum,

following order: viz. 1. *Quadrumana*, 2. *Cheiroptera*, 3. *Feræ*, 4. *Cetacea*, 5. *Pachydermata*, 6. *Ruminantia*, 7. *Rodentia*, 8. *Edentata*, and 9. *Marsupiata*. The MS. catalogue of this collection being prepared early in 1837, was ordered to be published and appeared in 1838. Since the publication of that catalogue I have adopted M. de Blainville's views respecting the *Insectivora*, that is, in regarding them as a separate order. In placing the Marsupial animals at the end of the series I followed M. de Blainville and Prof. Owen, and was especially induced to do so through the writings of the latter author.

This classification, which has been adopted by Prof. Owen and Mr. Martin, it will be seen, is essentially the same as the one here proposed, though, by placing the orders as in the above table, many important facts may be expressed which could not be displayed by arranging them in a linear series. I ought to observe, that in Prof. Owen's linear disposition of the orders (see the 'Cyclopædia of Anat. and Phys.' part 21), the Edentata precede the Rodents, and are not, as in the Catalogue of the Zoological Society's Collection, placed *after* that group. This change I adopt, but with some hesitation.

* See Recherches d'Anatomie comparée sur le genre *Stenops* d'Illiger, by Prof. Vrolik.

which is much less contracted in front, and is produced posteriorly so as almost totally to conceal the cerebellum*.

Taking the general form of the brain into consideration, the Placental Mammalia would appear divisible into two sections: first, those in which the cerebrum is generally of a rounded form, obtuse in front and provided with distinct convolutions; and secondly, those in which the cerebrum is destitute of convolutions, or nearly so, and usually contracted in front. The first division would contain the *Quadrumana, Carnivora, Cetacea, Pachydermata* and *Ruminantia,* and the second would contain the *Cheiroptera, Insectivora, Edentata* and *Rodentia.* Again, the succession of the orders of the first division as they are placed above would, in a general way, tolerably well express the grade of development in the parts of the brain of each, the proportion of the cerebrum to the cerebellum, and of these to the spinal chord and medulla oblongata. The medullary substance of the cerebrum is at first deep, and the capacity of the lateral ventricles is small; the optic lobes and the olfactory tubercles are also small in proportion to the brain, whilst the corpus striatum, optic thalami and corpora striata are well developed. The cerebellum is concealed, whilst in the last-mentioned of these orders (the *Ruminantia*) the cerebellum is exposed; the medulla oblongata and spinal chord are proportionately large, and so are the optic lobes, and the olfactory tubercles still more so. The *Carnivora* form an intermediate group in these characters.

I must notice however the remarkable exception which the Seals and *Cetacea* form: they both have a highly organized brain; the Seals as compared with other *Carnivora,* and the Cetaceans immensely so, as compared with the orders near which they are placed. We should however perhaps take into consideration that the brain has to be educated from without; and when we perceive the imperfections in the educatory media—the senses—in the Whales, where the organ of smell is either wanting or exists only in a very imperfect condition, where the hands are transformed into fins covered by a common integument, we can conceive that the highly organized brain is given to the Whale to compensate for these deficiencies, and that its intelligence is not necessarily in degree equal to what might be inferred from the consideration of the brain abstractedly. The same remarks will apply to a certain extent to the Seals, and to some other mammals.

In the other classes I will not pretend to say that the order of succession of the groups will display the modifications exhibiting a higher or lower grade of organization in the brain; the

* The brain of *Midas rufimanus* is figured and described by Prof. Owen in Part I. of the Philosophical Transactions for 1837.

materials at my disposal for forming a just conclusion on this point are most inadequate.

But are we in a condition to take for basis of a classification of the Mammalia, the structure of the brain?—I think not: though in the case of the *Marsupialia* it has afforded characters serving to separate that from other sections, and to indicate its proper position in the system, I am not prepared to follow those naturalists who would, in our present state of information, take this organ as one of primary importance in the distribution of the orders of the Placental series of Mammals. I cannot adopt the two great sections of this series as apparently indicated by the smooth and anteriorly contracted cerebrum on the one hand, and the convoluted cerebrum with its rounded anterior portion on the other. Were I to do so, I should find it necessary to remove some of the Lemurs from their group in the highest order of the first section, and to place them in the second section.

As regards the Cetaceans, although the condition of the senses may be taken into account in considering the brain with a view to forming an estimation of their intelligence, so highly an organized brain as is possessed by that group, it appears to me, forbids its being placed at the end of the class, as has been done. The stomach is very complicated, being divided into four or more compartments. The dentition is very abnormal; the teeth however will, I strongly suspect, bear a closer comparison in their structure with the simple teeth, sometimes observed in the first great carnivorous section (as in some of the Seals) than with the simple teeth of the *Edentata*. On the whole, the *Cetacea* are perhaps most conveniently located between the great carnivorous and the herbivorous sections; and as in the table, they may be connected with the *Pachydermata* through the Lamantin, &c., and with the *Carnivora* through the Seals. As regards the latter, the relationship of the *Cetacea* to the Seals, this is certainly somewhat remote, for the multilobulate kidneys, formed in both groups, as well as those characters which are simply adaptive for their aquatic habits, I cannot but regard as of little value as indicative of affinity.

The Manatus, Dugong and Rytina have by Cuvier been associated with the true Whales. From this view De Blainville, Prof. Owen*, and some other zoologists and anatomists have dissented. De Blainville places the animals in question with the *Pachydermata*, and Prof. Owen strongly inclines to the same opinion: "We have seen (observes Prof. Owen) that the whole of the internal structure in the herbivorous *Cetacea* (Dugong,

* See this author's account of the anatomy of the Dugong in the Proceedings of the Zoological Society for March 1838; and Ann. Nat. Hist. vol. ii. p. 300.

Manatus, &c.) differs as widely from that of the carnivorous *Cetacea* as do their habits: that the amount of variation is as great as well could be in animals of the same class, existing in the same great deep. The junction of the Dugongs and Manatees with the true Whales cannot therefore be admitted in a distribution of animals according to the organization. With much superficial resemblance, they have little real or organic affinity to the Walrus, which exhibits an extreme modification of the amphibious carnivorous type. I conclude, therefore, that the Dugong and its congeners must either form a group apart, or be joined, as in the classification of De Blainville, with the Pachyderms, with which the herbivorous *Cetacea* have the nearest affinities, and to which they seem to have been more immediately linked by the now lost *Dinotherium*."

On the whole then it appears to me, that the researches of the author just quoted, and of De Blainville, will bear out the assumption, that the animals forming the family of herbivorous *Cetacea* in the 'Règne Animal' are in fact aquatic *Pachydermata*, bearing the same relations to the ordinary Pachyderms as do the Seals (of which group the Walrus forms part) to the *Carnivora*. That there is a strong analogy between these animals and the true Cetaceans cannot be denied, but that there is any direct affinity I think is doubtful.

In the circles representing the different orders, I have introduced those genera belonging to each which appear to approach most nearly to other orders. Most of these approaches of genera of one order to the general characters of other orders have been before pointed out; I cannot pass on, however, without making some observations upon the nature of these approaches. Examples of this kind are numerous, and have given rise to a common belief, that, as a general rule at least, the various sections of animals, even those of the highest value, are gradually linked together. It has been most frequently stated, that the groups, large and small, of which the animal kingdom is composed, blend imperceptibly into each other; and supposing this view to be correct, it follows that there are many species so well balanced in their characters, that they cannot in a classification, without doing violence to those characters, be placed in any particular order; these links must be arranged *between* the orders, the characters of which they combine. But in those groups to which I have paid most attention, I will venture to assert, that species which even appear to require to be so located, are far from being numerous, and moreover, that in proportion as knowledge of the groups and species increases, so does the number of supposed links decrease; that is to say, it becomes less and less doubtful as to the group in which an animal should be placed. A short

time back the section *Marsupiata* was regarded by many as an unnatural assemblage of species which in reality belonged to other orders or groups; and on this point Prof. Owen observes, "It may be admitted, that at the period when the most judicious and learned naturalist, the then Vice-secretary of the Zoological Society, published his reasons for rejecting the *Marsupialia* as a distinct group in the 'Systema Mammalium,' and for distributing them among different placental orders, according to their supposed closer affinities, the contrary views set forth by M. de Blainville were defective in that kind of evidence which could alone render them convincing. The organization of the Marsupial animals was not at that time sufficiently elucidated to render any opinion as to their natural affinities really valid. Subsequent dissections have however shown, that the hypothesis which Cuvier had sanctioned by his authority was correct. The Marsupial animals have been proved to agree among themselves, and to differ from the analogous placental species by several important modifications not suspected when the Mammalia in the museum of the Zoological Society were arranged according to the quinary system *."

Here we have a case, which, though it goes beyond my proposition, will serve to illustrate the impression which I wish to convey: various Marsupial animals, which are now all but universally admitted to form a natural group, have been supposed (when materials for forming a just conclusion were not at hand) to be members of other great divisions of the Mammalia.

Mr. Bennett asks, "What is there of importance in the structure of the Wombat, except this solitary character of the Marsupium, to separate it from the Rodent order?" But further information of the Wombat is acquired; it is found to possess some other characters in common with the other *Marsupiata*. "Surely the different groups of animals are imperceptibly linked together," might then have been the remark; or, it might have been discovered that other animals possessing the pouch approached very nearly to this supposed Rodent on the one hand and to the carnivorous Marsupials on the other, and the same remark might have been uttered. What said Cuvier in 1839 relating to this same animal?—"That it is a true Rodent as regards its dentition and intestines, its only relation to the *Carnivora* being evinced in the articulating portion of the lower jaw; and in a rigorously exact system it would be necessary to place it with the *Rodentia*; we should, in fact, have there arranged it, if we had not been led to the Wombat by a regular uninterrupted series from the Opossums to the Phalangers, from them to the Kangaroos, and from

* Trans. Zool. Soc. vol. ii. part iv. p. 330.

these last to the Wombat; and, finally, if it were not that the organs of generation in that animal were perfectly similar to those of all belonging to the family *Marsupialia*." The Wombat then is an animal which appeared to link two orders or large sections, the *Rodentia* and the *Marsupiata*; but this case would have been insufficient to support the belief that these two groups *very* gradually blended into each other; for (admitting the Wombat approached very near to the Rodents) it would have been further necessary to point out the species of Rodents which linked the order, of which they formed part, with the Wombat. Cuvier observed that this animal was gradually linked with other *Marsupiata* (very dissimilar to the Rodents) by intermediate species, and mentions that fact as one which induced him to place it in the Marsupiate division, but he does not point out similar links on the Rodent side. A thorough examination of the Wombat and numerous other *Marsupialia* has now shown that these animals are much more closely connected than was supposed; most important peculiarities in these animals have been discovered, and the degree of relationship which the animal under consideration bears to the Rodents must in proportion be modified. On the other hand, Prof. Owen, in his dissection of a certain Rodent (the Biscacha*, *Lagostomus trichodactylus*), has discovered peculiarities in the female generative organs of that animal in which it approaches nearer to the Marsupial type than has hitherto been observed in any of the Placental series: this is evinced in the presence of a longitudinal septum dividing the vagina into two canals for upwards of an inch beyond the *ora tincæ*; "rudiments of a vaginal septum," the Professor remarks, "occur in the young or virgin state of several genera; but it is only in the *Lagostomus* that a continuation of the median separation of the genital tubes has been continued beyond the uterine portion along so great an extent of the vagina and as a permanent structure." Let it be added to this, that in the order *Rodentia*, generally, other characters have been pointed out which indicate that this group evinces the nearest approach to the *Marsupiata*, yet as regards the two nearest species respectively of these neighbouring groups I cannot perceive, on the one hand, any traces in the Wombat of the peculiar characters which distinguish the *Lagostomus*, or the little family to which it belongs, from other Rodents, and *vice versâ*. There is, in fact, a considerable hiatus between the two groups. The *Lagostomus* is essentially a Rodent, but being one of the members of an order which in the Placental series is perhaps, on the whole, the furthest removed from the head of that series, and also it being certainly one among the

* Proceedings of the Zoological Society for December 1839, p. 177; Ann. Nat. Hist. vol. vi. p. 68.

lowest species of that order, it begins to present that condition of the generative organs which characterizes the last section of Mammals (the *Marsupiata*), and which is there accompanied with other characters approaching the oviparous types. These facts and conclusions relating to the Biscacha induce me to place the genus to which it belongs in that part of the circle representing the Rodent order which is nearest to the circle of the *Marsupiata*. But I cannot place the Wombat (*Phascolomys*) in the corresponding part of the Marsupial circle without observing, that it appears to me its relationship to the Rodent group is of a different nature (or at least differs in degree); that it is only in what has been aptly termed '*adaptive characters*' that its approach is evinced. These adaptive characters (which I conceive are by no means necessarily connected with affinity) consist in a superficial resemblance, owing to certain similar modifications of organs connected with the habits of the species: thus the Flying Lemur (*Galeopithecus*), Flying Squirrel (*Pteromys*), and Flying Phalanger (*Petaurus*) have a considerable resemblance to each other, arising from each being adapted to a mode of life which is in some respects the same in all, but the groups to which the three animals belong are in important zoological characters essentially different; yet it must be observed, that as the Rodents and *Marsupiata* are more near to each other than either are to the *Lemuridæ*, there exists a difference of degree as regards the extent of the hiatus which separates the three flying animals referred to: so it is I believe with the Wombat; it resembles the Rodents in certain adaptive characters, and the approach to the Rodents is only in degree equal to the approach of the order *Rodentia* to the order *Marsupiata*. The *Lagostomus* not only possesses characters which link the *Rodentia* to the *Marsupiata generally*, but goes beyond other species of its order in having a modification of its generative system which approaches it still more nearly to the last-mentioned group. The Wombat even in dentition agrees essentially with the Marsupial type, and not, as was supposed, with the Rodent.

It is in cases like one or the other of the two which I have endeavoured to illustrate, that I believe the several genera introduced in either of the circles of my table evince an approximation to other circles. I do not perceive that the orders imperceptibly blend into each other, nor am I at all satisfied that even in minor groups (such as families and genera) this perfect blending takes place.

The question which arises from such a position is, whether any species is formed essentially on two types of the same rank? Each animal is framed to perform certain functions, and is most perfectly adapted to those functions; but beyond this, is not each

species framed upon some general and particular model? Certainly it may be said with respect to the Water-rat (*Arvicola amphibia*), that it is framed on the Vertebrate model; on the Mammalian type of that model; on the Rodent type of the Mammalia; and it is equally clear to my senses that it possesses the same general structure of skull, combined with the anchylosed fibula to the tibia, &c., which characterize the Murine family of the Rodent order; but, beyond this, it exhibits a modification in the structure of the teeth in which it agrees with numerous other species of the family mentioned, and which are classed under the generic title *Arvicola*. So that in one sense the Water-rat may be said to be essentially framed upon more than one model, but, from the lowest to the highest of the divisions mentioned, each model is a modification of the type of the division which precedes it; and the case might be therefore symbolically represented by concentric circles of different sizes, the largest of which would typify the *Vertebrata*, and the smallest the genus *Arvicola* and so on. It does not appear that the Water-rat is framed upon two or more types *of equal rank*, and I strongly incline to the belief, that what is true of one species, as regards the point under consideration, is true of all.

There is one other point relating to the genera introduced in the table to which I wish to call attention, viz. that it often happens that those species of one order which approach most nearly to other adjoining orders, are not met, as it were, by a corresponding approach in those adjoining orders. Each order may throw out rays (to speak figuratively) to other orders, but the rays are seldom in the same direction. I have noticed one case illustrative of this point, that of the Wombat and *Lagostomus*: many might be adduced. Among the *Carnivora*, the genus *Mydaus* in general appearance and in its insectivorous diet resembles the species of the order *Insectivora*; but it differs widely in its dentition, having but one true molar to each side of each jaw, as in others of the group to which it belongs. On the other side we find a considerable approach evinced in the genus *Gymnura* (one of the *Insectivora*) to the Carnivorous order*, displayed in the general form of the skull, in the presence of six incisors (a number unusual in the *Insectivora*), and well-developed canines. Here I can only perceive an approach, on the one hand, of one of the *Insectivora* to the order *Carnivora*, and on the other, one of the *Carnivora* approximating to the *Insectivora*. But the two animals mentioned do not approach towards *each other* in corresponding modifications of structure, for the *Gymnura* would bear a closer comparison with some of the small *Ursidæ*, where the

* This animal in fact was originally described as a *Viverra*.

true molars are two in number, and sometimes not only assume the quadrate form but the prickly crowns, and even the four principal cusps as in *Gymnura*. In *Mydaus* (which is one of the *Mustelidæ**) the single true molar is of a very different general form, though the tubercles on its surface are somewhat acute: neither of these cases, in my opinion, exhibits an approach of direct affinity; and that instance of a certain resemblance between the *Gymnura* and the *Ursidæ*, just alluded to, it will be perceived, affords another illustration of points discussed in this paper; for among the *Ursidæ*, that species which in the structure of its molar teeth approaches more nearly to the *Insectivora*, is one which in other points is most removed from that order,—I allude to the *Ailurus*, which is remarkable in its group for the possession of retractile claws. It might be asked, "Does this latter animal then evince any affinity with the Cats, which are pre-eminently distinguished for their retractile claws?" In no one other character can I perceive the slightest approach; and yet many zoologists insist much upon the modifications of the extremities as of primary importance in classification. There are undoubtedly cases in which such characters are of considerable value, but this is when they are combined with others of acknowledged value, as in the case of the hoofed foot of the Ruminants, which is combined with the ruminant stomach and other peculiarities. I wish not to be misunderstood: I would reject no character, but I do not regard the same modification as always of the same value; *that* I should estimate by its constancy, *combined* with other peculiarities.

In the circle *Quadrumana*, I have placed the *Galeopithecus* or Flying Lemur near the Cheiropterous group †; not only be-

* *Mydaus*, as well as *Arctonyx* and *Ratelus*, I do not hesitate to arrange with the Badgers (*Meles* and *Taxidea*), which form, according to my views, a little group of the *Mustelidæ* (and may be called *Melina*), and not of the *Ursidæ*, with which they are generally associated. They are clearly linked with the typical *Mustelidæ* by means of the Skunks (*Mephitis*). From the *Ursidæ*, among other characters, they are readily distinguished by their possessing but one true molar on each side of each jaw—the Bear tribe having two. The *Mustelidæ* approach the *Ursidæ* and the *Insectivora* in having no cæcum, and in the absence of any decided division between the large and small intestines.

† The *Galeopitheci* are arranged by many mammalogists with the *Cheiroptera*; I have always however regarded them (as well as the Aye-Aye) as constituting an aberrant form of the *Lemuridæ*, and in addition to the points of resemblance noticed in my paper on the group, published in the Zoological Society's Transactions, I may call attention to others existing in the intestinal canal, pointed out by Cuvier in his 'Leçons d'Anatomie Comparée:' "Les *Galéopithèques* se distinguent des autres *Cheiroptères*, et se rapprochent des *Lémuriens* par la présence d'un très grand cæcum, et la division du canal intestinal en gros et petit intestin."—M. de Blainville, in his great work on Osteology, now in course of publication, has placed the group in question with the *Lemuridæ*, and shown ample reasons for so doing.

cause it has the flank membranes extended from limb to limb, which enable it to sustain itself to a certain extent in the air, but because in its dentition, more especially in the structure of the molar teeth, there is a great resemblance to the ordinary *Vespertilionidæ.* The higher *Quadrumana* are remarkable among Mammals for the possession of a perfect bony socket for the eye, as in man; but as we descend in the Quadrumanous group the socket becomes less perfect; the malar bone, which forms the outer and part of the lower boundary of the orbit, is at first produced backwards, and joins with the sphenoid, superior maxillary and frontal bones to form a complete socket for the eye: this character runs through the whole of the old and new world Monkeys with slight modifications only, indicative of a receding from man. In *Tarsius spectrum** the socket is still comparatively perfect as compared with other *Lemuridæ,* where the orbital process of the frontal bone, joined with the malar bone, merely forms a broadish ring forming the outer boundary of the orbit. Lastly, in *Galeopithecus* we find the orbital process of the malar and frontal bones unconnected; there is indeed a considerable hiatus between the two processes. Here, again, we find an approach to the Bats: in these animals the orbital processes are generally wanting, but in the *Pteropi* those of the frontal bones are much produced; and so far, as well as in the general form of the skull, in having more perfect hands than other Bats, and in their frugivorous diet, they evince the nearest relationship observed in this group to the *Lemuridæ*; but there is no gradual blending of the two groups. The dentition of the *Pteropi* is most unlike that of *Galeopithecus*: the resemblance existing between the molar teeth of the latter animal and the Bats, before alluded to, holds good with the Bats generally, *with the exception of the Pteropi.*

Among the *Insectivora* is a genus (*Tupaia*) which has a skull and dentition remarkably approximate to that of the Lemurs. In the *Insectivora* generally the zygomatic arch is but little developed or is incomplete, and there is no orbital process; but in *Tupaia* the zygomatic arch is well developed, and the malar and frontal bones join to form a complete though slender bony orbit: the latter bone (the malar) is remarkable for being perforated, a

* In the Tarsius, an approach to that extraordinary animal the Aye-Aye may be perceived in the superior development of the two foremost incisors of the upper jaw. The canines are very small compared with the ordinary *Lemuridæ*; and it is in the loss of these teeth and the other incisors (which are minute in *Tarsius*), and some of the false molars, which produce in the Aye-Aye so strong a resemblance (as regards the condition of the teeth) to the *Rodentia* as to have induced Cuvier and others to place it in that order. De Blainville has most ably combated this opinion and shown the true relations of the animal in question, and has not omitted to notice this fact, which had struck me, however, before I had seen his paper.

character which I do not recollect to have met with, except in the *Lemuridæ*; here it is sometimes of moderate size, but generally very small*. The resemblance in the dentition may be said to extend to number and form, excepting that in *Tupaia* there is an extra small false molar in the lower jaw: the lower incisors here have moreover the same horizontal direction and the same little keel along their upper surface as in the Lemurs.

I will here make one or two general remarks upon dentition. On the structure I will not comment; but as regards the number of certain teeth, some generalizations may be obtained which are important, and none of which are violated by the arrangement adopted. In the first place, in the Placental series there are never more than six incisors in each jaw; this is what may be termed the normal number in the *Placentalia*; an occasional absence of the full number in some groups is unimportant, as nearly allied species (in the *Carnivora* for instance) sometimes differ in the number of the incisors, and even the same individual may, when young, have the full number, but not when adult. There are cases, however, in which there is a permanent reduction in the number of incisors, as in the *Quadrumana*, which have normally $\frac{4}{4}$. I can only call to mind two exceptions even in which there are *less* than this number, and they are in *Tarsius spectrum*, where there are $\frac{4}{2}$, and the Aye-Aye, where there are $\frac{2}{2}$. The *Cheiroptera* have never more than four incisors in the upper jaw, and it is only in the lower divisions of the group that that number is exceeded, there being $\frac{4}{6}$. In the *Insectivora* the incisors are sometimes clearly $\frac{6}{6}$ and sometimes less, but in the greater portion of the species the intermaxillary suture is obliterated at so early an age, that the precise number of incisors has never been determined. The *Marsupiata* are remarkable either for having the incisors exceeding the normal number, being sometimes as many as $\frac{10}{8}$ or $\frac{8}{6}$, or for having but two incisors in the lower jaw when there are less than eight above; no Marsupial has incisors $\frac{6}{6}$, and there is but one species (the Wombat) in which the number in both jaws is the same. As regards true molars, there is no case among the *Placentalia* clearly made out in which there are more than $\frac{3-3}{3-3}$. In the *Marsupiata* there are normally $\frac{4-4}{4-4}$. The *Carnivora* (with one exception only) never

* Often there is more than one of these minute perforations in the malar bone of the Lemurs.

have more than $\frac{2-2}{2-2}$ true molars, and the decrease from this number to $\frac{2-2}{1-1}$, or $\frac{1-1}{1-1}$, or $\frac{1-1}{0-0}$, is important, inasmuch as, with but one or two exceptions, it is combined with other characters indicative of the great divisions in that group.

The *Pachydermata* vary much in their dentition, in some there being the four kinds of teeth well developed and greatly resembling that condition which characterizes the first great carnivorous and frugivorous section, as in the genus *Sus*, to which the little insectivorous animals forming the genus *Centetes* bear considerable resemblance in the general structure of the skull and the greatly developed canines, as well as in external characters. Other Pachyderms again (as the Horses) approach the Ruminants in a very marked degree; and lastly the Elephants, though linked with the ordinary *Pachydermata* through the extinct Mastodons, &c., differ remarkably from the normal species in their dentition, in which there is an approach to that of the Rodents; an approach is also perceptible in the sanguiferous system.

A relationship between the Sloths and the Ruminants is displayed in the structure of the stomach.

In all these instances of approach of species of one order to other orders here noticed, there is not a single case which would fairly bear out the notion that these orders imperceptibly blend into each other. There is always a tolerably well-marked line between them (hence I have enclosed the orders in circles). The aberrant species are readily traced back as it were into their own groups, and when they evince an approach to other circles, it is rather to the *order* than to any particular species of the order.

In conclusion, I would offer the following propositions and observations for consideration :—

Species of animals belonging to the same genus have an affinity to each other; genera of the same family have a mutual affinity; relationship of affinity may likewise exist between families of the same order and orders of the same class, but the degree of affinity is different in the different cases; it is more or less remote. Thus species of the same genus have an affinity of the *first* or nearest degree;

species of different genera of the *second* degree only;
——— of different families of the *third* degree;
——— of different orders of the *fourth* degree;
——— of different classes of the *fifth* degree.

A relationship may exist between species of different groups, which differs from either of the cases just mentioned; that which is commonly termed by naturalists a relationship of analogy. This again may vary in degree according to the affinities and

relative rank of the groups which present the cases of analogy. The analogy may be more or less remote: thus the case of analogy (so often quoted as such), as existing between the Goatsucker (*Caprimulgus*) and the Bat—members of different classes—might be regarded as an instance of analogy, say of the *fifth* degree; that of the Otters to the Beavers (animals of different orders of the same class), an analogy of the *fourth* degree; and that of the Beaver to the Coypu* (both Rodents), an analogy of the third degree: again, the relationship existing between the Whales and Fishes may be one of analogy of the fifth degree; that existing between the Dugong and the Porpoise may be one of affinity or analogy; but in either case is less remote than the relationship of the *Cetacea* to the Fishes.

According to these propositions moreover, the relationship of the *Lagostomus* to the *Marsupiata* might be one of affinity of the fourth degree, whilst that of the Wombat to the *Rodentia* might be one of analogy of the same degree: that of the Wombat to the *Phalangistidæ*, an affinity of the third degree, and of the Koala to *Phalangista*, an affinity of the second degree; and lastly, that of *Phalangista vulpina* to *Phalangista Cookii*, of the nearest or first degree. The affinity of the *Monotremata* to the class *Reptilia* would be several degrees further removed than that of the *Echidna* to the *Ornithorhynchus*.

LI.—*Catalogue of the Birds found in Corfu and the other Ionian Islands, also on the coast of Albania; from Notes made during a sojourn of four years.* By H. M. Drummond, 42nd R.H. With Notes by H. E. Strickland, M.A.

[This valuable paper was read to the Zoological Section at Cork, and being afterwards placed in my hands, I have ventured to append a few notes before sending it to press. When I was at Corfu in 1835 I had the pleasure of becoming acquainted with Captain Drummond, at that time I believe the only ornithologist in the Ionian Islands. He had even then formed a considerable collection, and the following list will show the great extent of his subsequent researches. The nomenclature is that of Temminck's 'Manuel d'Ornithologie,' and though the names have undergone modifications from later ornithologists, yet there will be no difficulty in recognising the species by means of them. I have annexed the letter B. to those species which have also occurred in Britain.—H. E. S.]

* These two animals are essentially modelled upon different types of the Roden torder.

Vultur cinereus. Very rare: three of these birds were shot at Cerigo in 1842: has never been noticed in Corfu.

—— *fulvus*. Very numerous in Albania, and is occasionally seen in Corfu throughout the year.

Cathartes percnopterus (B.). More frequently seen in Corfu than the above, and breed there.

Gypaëtus barbatus. An occasional visitant: common in Albania.

Falco peregrinus (B.). Found in the islet of Ovo near Cerigo; also the island of Fano in the north channel of Corfu, where they breed in considerable numbers: has never been noticed in Corfu.

—— *subbuteo* (B.). Arrives at Corfu in flocks about the 1st of April; does not remain, but returns on its way south in autumn.

—— *tinnunculus* (B.). Sedentary.

—— *tinnunculoides*.
—— *rufipes* (B.). } These birds arrive in large flocks about the 20th of April and remain till the middle of May; they are generally seen in company, hovering over the marshes in search of insects, which they seize and devour on the wing.

—— *imperialis*. Very rare: has been shot in Cerigo, never seen in Corfu.

—— *fulvus* (B.). Very rare: occasionally seen on the Albanian coast.

—— *haliaëtus* (B.). Sedentary.

—— *albicilla* (B.). Very common on the Albanian coast, and occasionally seen in Corfu throughout the year.

—— *nisus* (B.). Arrives in Corfu in September and remains all winter.

—— *milvus* (B.). Very rarely seen in Corfu: very common in the winter at Santa Maura.

—— *ater*. This very rare bird is an occasional visitant at Cerigo, but has not been noticed in any of the other islands.

—— *buteo* (B.). Common: sedentary.

—— *lagopus* (B.). Very rare: has been shot in Cerigo, never seen in Corfu.

—— *apivorus* (B.). Very rare: has been shot in Cerigo, never seen in Corfu.

—— *rufus* (B.). Very numerous, especially in winter, frequenting the marshes: feeds upon frogs and lizards.

—— *cyaneus* (B.). Very common: breeds on the main land, and is found in the dusk of the evening in great numbers in the marshes, where they roost.

Strix flammea (B.). Not very common: sedentary.

—— *passerina* (B.). Very common: sedentary *.

—— *bubo* (B.). Generally seen in winter: rare in Corfu: one was shot in the island of Vido in April 1835, in making his escape out of a hen-roost, and on examination his crop was found to contain, instead of a chicken, a large rat which he had recently killed and swallowed whole.

* This is not the *Strix passerina* of Linnæus, and is now denominated *Strix* (or *Athene*) *noctua*, Retz.—H. E. S.

Strix brachyotus (B.). Numerous during its passage north in April; does not remain.

—— *scops* (B.). Arrives about the 15th of April; some few remain during the summer.

Corvus corax (B.). Very numerous and always seen in flocks, and breed among the rocks of the citadel.

—— *cornix* (B.). Occasionally seen in Corfu: very common in Albania, where they breed.

—— *frugilegus* (B.). Arrives in October, and takes its departure for the north in February.

—— *monedula* (B.). Sedentary.

Garrulus picus (B.). Numerous in Albania, where they breed: rare in Corfu.

—— *glandarius* (B.). Very numerous: sedentary *.

Coracias garrula (B.). Arrives at Corfu about the 15th of April and remains till the middle of May: not very common.

Oriolus galbula (B.). Very common: arrives 25th of April: a few remain to breed.

Sturnus vulgaris (B.). Common during the winter months, never seen in summer.

Pastor roseus (B.). An occasional visitant: rare.

Lanius meridionalis. Arrives 20th of April: very common: breeds.

—— *minor*. Arrives about the 25th of April: rare: does not remain †.

—— *rutilus* (B.). Very numerous: arrives 1st of April, remains all summer.

—— *collurio* (B.). Makes its appearance about the 15th of April: rare: does not remain.

Muscicapa grisola (B.). Very common: arrives first week of April: breeds.

—— *albicollis*.
—— *luctuosa* (B.). } Common during its passage: arrives beginning of April, and is not seen after the 15th of May.

Turdus musicus (B.). Common in winter, never seen in summer.

—— *merula* (B.). Common in winter: breeds on the mountains on the main land.

—— *saxatilis*. Rare in Corfu: arrives 10th of April: breeds on the mountains.

—— *cyaneus*. Common: remains all the year round.

Sylvia turdoides. Arrives in Corfu the first week of May: very numerous in the marshes, where they squeak and screech all day long,

* The common jay of Syria, Asia Minor and Greece, is not the *Garrulus glandarius* of Britain, but the nearly allied species with a black crown, *G. atricapillus*, Geoff. (*G. melanocephalus*, Gené.), but Capt. Drummond assures me that the jay of the Ionian Islands is identical with that of Britain.—H. E. S.

† *Lanius meridionalis* is generally considered as very rare in the south of Europe, and *L. minor* as very common. In the Ionian Islands, however, unless there be some error of transcription or of identification, the reverse would appear to be the case.—H. E. S.

the cock bird clinging to the top of some high reed watching his mate, who builds her nest suspended about a foot above the water, attached to the stems of four reeds, and lays four or five eggs; they take their departure about the end of August.

Sylvia olivetorum (Strickland). This bird is very common in Corfu; it arrives about the 15th of May: they frequent the olive-groves; their song is very fine, and though not loud, has more music in it than that of most birds; it moves to the south in August*.

—— *palustris*. Arrives about the same time as the above, and from the similarity of its song might be mistaken for it. I have however heard it imitate other birds with great effect: though I have seen it along the banks of rivers and in the marshes, yet I have more frequently found them in the olive-groves.

—— *phragmitis* (B.). Common: sedentary.

—— *arundinacea* (B.). Common: sedentary.

—— *luscinia* (B.). Arrives about the 10th of April, but does not remain.

—— *rubiginosa*. Very common in Corfu; it arrives about the 10th of May and remains throughout the summer. This bird is named the rufous sedge warbler (Gould), a name in my estimation not at all appropriate, as it is never seen among sedges or in marshy places, but frequents the vineyards and olive-groves, especially the former, where the male may be constantly seen on a clod of earth or on the stump of a vine, jerking his broad tail over his back and spreading it out like a fan, at the same time uttering his monotonous chant, which consists of four or five notes, commencing low and ending high, and is repeated very quickly. I should rather call it the fan-tailed warbler, as being a name more suited to its habits.

—— *atricapilla* (B.). Arrives about the 20th of March and is very numerous during its passage, but does not remain.

—— *melanocephala*. Very common: remains all the year round.

—— *cinerea* (B.). Arrives beginning of April: breeds.

—— *rubecula* (B.). Arrives about the 1st of October and takes its departure the end of February; on their arrival these birds may be seen hung up in the market in bunches, and are sold as *Becaficas*.

—— *tithys* (B.). Arrives in the autumn and remains all winter.

—— *phœnicurus* (B.). Passes on its way north about the end of March, but does not remain.

—— *hippolais*.
—— *trochilus* (B.). } Arrive in the spring: a few remain to breed, but they are most numerous in September and are then very fat, and are eagerly sought after by the Greek sportsmen; (these, as far as I can learn, are the true *Beca-fica* so esteemed by epicures). Of *S. trochilus* a few remain during the winter.

* This species, first described in Gould's 'Birds of Europe' from a specimen which I obtained in Zante in 1836, appears not to have been noticed out of the Ionian Islands, though it migrates (doubtless to Africa) in winter. Capt. Drummond's observations on its habits precisely coincide with my own. It is now placed in the genus *Calamoherpe* by the Prince of Canino. —H. E. S.

Sylvia conspicillata. Very common: arrive 27th of March and remain all summer.

Regulus ignicapillus (B.). Found during the winter in Corfu, and frequent the olive-groves in considerable numbers: disappear in spring.

Troglodytes vulgaris (B.). Not very common, but remains during the year.

Saxicola œnanthe (B.). Common during the passage: arrives the end of March.

——— *aurita.* Arrives in considerable numbers 1st of April: does not remain.

——— *stapazina.* Arrives in considerable numbers 1st of April: a few remain during the summer, and breed on the citadel rock at Corfu*.

——— *rubetra* (B.). Rare: seen occasionally during the winter.

——— *rubicola* (B.). Very common: remains all the year round.

Motacilla alba. This is the common pied wagtail of the continent, and differs from the English one; is most numerous in winter, when they may be seen in large flocks frequenting the marshes: disappears in summer.

——— *flava* (B. ?). This bird also differs from the common yellow wagtail of England in having the head in the breeding-season of a jet-black, at other times it is of a lead-colour†. These birds appear in great numbers about the 1st of April, but disappear in winter; in the spring they are caught in large numbers by means of the clapnet, and are sold for a penny a-piece to the Greeks, who generally cut their wings and turn them loose in their houses for the purpose of destroying the flies, which they soon learn to do, catching them in the most dextrous manner; consequently this and the foregoing species only are known by the name of the flycatcher. The *Muscicapa* is never used for this purpose.

* The general opinion among ornithologists now is, that *Saxicola aurita* is only a different state of plumage of *S. stapazina,* though I believe their identity is not yet actually demonstrated. On this point Capt. Drummond writes to me, "*Saxicola stapazina* and *S. aurita* I consider as decidedly different birds. The *aurita* is far more numerous in Corfu during its passage in the spring, but I have never seen it during the summer months; while, on the other hand, the *stapazina* breeds there, and I have found their nests on the citadel rocks." These facts however are quite consistent with the specific identity of the two birds, for if the so-called *S. aurita* be only the winter plumage of *stapazina,* its apparent disappearance in spring would be owing, not to emigration, but to a change of costume.—H. E. S.

† This is an important statement, as the black-headed wagtail is considered by the Italian naturalists to be a distinct species from the gray-headed ones, which they further divide into two species, one with a white stripe over the eye (*M. flava* of North Europe and accidentally of Britain), and the other without. Do all these three kinds inhabit the Ionian Islands? and do they all appear to pass into each other? It would be desirable to ascertain whether these supposed changes of colour take place in the domesticated individuals.—H. E. S.

Motacilla boarula (B.). Makes its appearance during the winter, but is rare.

Anthus rufescens.
—— *pratensis* (B.).
—— *arboreus* (B.).
} Sedentary: very common during the winter, but rarely seen in summer.

Alauda arvensis (B.). Arrives in Corfu the latter part of September, and takes its departure the following February.

—— *arborea* (B.). Arrives in Corfu the end of September in small flocks and remains during the winter, retiring to the high mountains of Albania in the spring.

—— *cristata*. Very numerous: remains all the year.

—— *isabellina*. Rare: arrives in the middle of April, does not remain.

—— *calandra*. Never seen in Corfu, but has been shot in Zante, where it is very rare. These birds were seen in great numbers at Lutraki, near Corinth, in June 1842, but I have not observed it in any other part of Greece.

Parus major (B.). Very common: sedentary.

—— *cæruleus* (B.). Very common: sedentary.

—— *caudatus* (B.). Occasionally seen in small flocks in winter.

Emberiza melanocephala. Arrives in great numbers about the beginning of May and remains all the summer, generally frequenting the vineyards, where it builds its nest in the stump of an old vine.

—— *miliaria* (B.). Very common: remains all the year.

—— *schœnicula* (B. ?). Seen in Corfu only during the winter*.

—— *hortulana* (B.). Arrives 10th of April; about the beginning of May they retire to the mountains to breed.

—— *cæsia*. Arrives in considerable numbers about 10th of April, but is found only on the hills where it breeds.

—— *cirlus* (B.). Sedentary, though not very common.

Loxia curvirostra (B.). Very rare: of accidental passage, but has been shot in Corfu, as I was informed through the kindness of Mr. Alexander, collector of customs and superintendent of the quarantine establishment at Cerigo, to whom I am indebted for much information concerning the birds of Cerigo; he is a zealous ornithologist, and has been recently joined by some of the English inhabitants in establishing a museum at Corfu, where he has consigned his valuable collection of birds of the Ionian Islands.

Pyrrhula vulgaris (B.). Seen only in the winter: rare in Corfu.

Fringilla coccothraustes (B.). Seen only in winter: some seasons very rare in Corfu, at others common: goes north beginning of April.

—— *chloris* (B.). Very common: remains all the year round.

—— *domestica* (B.). Very common: remains all the year round.

—— *cœlebs* (B.). Arrives in Corfu about the 1st of October: common during the winter: disappears the end of February.

—— *cannabina* (B.). Sedentary.

* I would suggest a query, whether this may not be the nearly allied species *E. pyrrhuloides*, Pall. (*E. palustris*, Savi), which is abundant in the South of Europe.—H. E. S.

Fringilla montium (B.). Sedentary.

——— *carduelis* (B.).
——— *citrinella.*
These birds are seen in large flocks, and generally in company during the winter, arriving the latter part of September and disappearing by the first week of April. A few of the former may sometimes be seen during the summer, but rarely, the latter never.

——— *spinus* (B.). Only one instance of this bird having been seen in Corfu, and that I shot just outside the town; it probably might have made its escape from the cage. I have never heard of its being seen in Albania or any of the islands previous to this instance.

Cuculus canorus (B.). Very common during the passage: arrives about the 10th of April, and have all passed by the beginning of May. They are killed by the Greeks in great numbers and sold as a delicacy.

Picus major (B.).
—— *medius.*
Are the only two of the family that are ever seen, and both these very rare even in Albania, and only one instance occurs of the former having been shot in Corfu.

Yunx torquilla (B.). Arrives the 20th of March: not very common: does not remain. In Malta these birds are so numerous during the passage that they are brought into market in basket-loads, when they are immediately stripped of their feathers, trussed, and the bill dextrously passed in under the wings; in this state they are sold in numbers to the uninitiated at a high price as fine fat snipes.

Sitta syriaca. Not very common in the islands, but occasionally seen among the rocks: they breed in Corfu and arrive there about the end of March.

Certhia familiaris (B.). Common in the winter, making their appearance with the fire-crested wren.

Tichodroma phœnicoptera. These very rare birds I have never seen in Corfu. Mr. Alexander informed me that they were found on the rock of Ovo at Cerigo in the winter, being, as he supposes, driven down from the mountains by the snow. It is also found in the cliffs of the island of Fano, where they have at different times been shot by Mr. J. Greenwood, son of the resident.

Upupa epops (B.). Very numerous during the passage: it makes its appearance among the first, arriving about the 15th or 20th of March: a few remain during the summer.

Merops apiaster (B.). Arrive about the 5th of April: some seasons they come in great numbers, and may be heard high up in the air and far out of sight, uttering their guttural cry, on their way to the north. Sometimes they will come and alight on some solitary tree in such numbers that I have known an instance of twenty-five having been killed at one shot. These birds are generally the immediate forerunner of the quail, from which they are generally called the king-quail. The stomach of several of these birds which I examined contained the remains of large hornets and brown moths of a large size: they do not remain.

Alcedo ispida (B.). Generally makes its appearance about the end

of August, and seen all the winter in great numbers frequenting the sea-shore: never seen in summer, and disappears the beginning of April.

Hirundo rustica (B.). The first of these birds arrive about the 15th of March, and about the 25th they are very numerous, remaining till next autumn.

——— *rufula*. This very rare bird I first observed in considerable numbers flying over a small marsh near Patras on the 17th of April 1836; I was unable to obtain a specimen at the time, and did not meet with them again till the 14th of April 1842, when I saw two of these birds in the island of Fano, one of which I shot. Its companion immediately disappeared, and though I was several days on the island, I never saw another.

——— *urbica* (B.).
——— *riparia* (B.). } Arrive about the first week of April: a few only remain to breed.

——— *rupestris*. These birds are never observed during the summer, as they probably either go north or take up their abode in the lofty mountains of Albania; but as soon as the cold weather sets in, they are seen skimming over the marshes in great numbers; a few stragglers may occasionally remain to breed, as I have seen a pair as late as the 20th of May.

Cypselus alpinus (B.). Arrives about the 20th of April, some seasons not till May: they remain till the autumn and breed on the citadel rocks.

——— *murarius* (B.). Arrive about the same time as the above and remain.

Caprimulgus europæus (B.). Arrives about the 10th of April, but does not remain.

Columba palumbus (B.). Occasionally seen in Corfu, and assembles in large flocks in winter on the coast of Albania.

——— *œnas* (B.). Occasionally seen, not very common.

——— *livia* (B.). Found in great numbers in the caves and rocks of the sea-shore in the different islands.

——— *turtur* (B.). Arrive the 15th of April in great numbers: a few remain to breed.

Perdix saxatilis. Rare in Corfu, but very numerous in Santa Maura, Ithaca, and some of the other islands.

——— *coturnix* (B.). The first of these birds make their appearance about the 27th of March; but the grand flight, which depends much upon the wind (which requires to be from the southward), does not arrive till the 10th or 15th of April, when they sometimes appear in such numbers, especially in the island of Fano, that instances have not been wanting of fifty or sixty couple being killed by a single gun in two or three hours. Many of them are so tired, that being unable to reach the land they fall into the sea and are instantly devoured by the gulls, *L. argentatus,* and the ravens, which hover about on these occasions in great numbers. They return again about the 15th of August, but many remain to breed, and a few even remain all the winter.

Glareola torquata (B.). Arrive in great numbers the 15th of April,

and are constantly seen skimming over the salt marshes in search of insects; by the first week of May they take their departure.

Otis tarda (B.). Very rare in the islands: a very fine male was shot in Corfu in February 1842.

—— *tetrax* (B.). Of regular passage in Santa Maura and Zante, arriving in the beginning of April: does not remain: never seen in Corfu.

Œdicnemus crepitans (B.). Common: breeds in some of the islands.

Himantopus melanopterus (B.). Occasionally seen during its passage in April in considerable numbers in Corfu, but does not remain.

Hæmatopus ostralegus (B.). Not very common: arrives about the 20th of March, does not remain.

Charadrius pluvialis (B.). Small flocks are occasionally seen during the winter months.

—— *hiaticula* (B.).
—— *minor* (B.). These birds arrive in great numbers the beginning of October, especially the *C. minor*, and remain till the end of May.

Vanellus melanogaster (B.). Seen occasionally in the months of April and September.

—— *cristatus* (B.). Very common during the winter.

Strepsilas collaris (B.). Occasionally passes in April: rare.

Ciconia alba (B.). Arrives the 1st of April, remains till middle of May.

Ardea cinerea (B.). Very rare in Corfu: occasionally seen in the spring.

—— *purpurea* (B.). Very numerous: arrive the 1st of April: breed.

—— *egretta* (B.). Never seen in Corfu, but common in Santa Maura and the salt marshes on the Albanian coast opposite Corfu: arrive in October and depart early in March.

—— *garzetta* (B.). Common in Corfu, and are found in Albania in troops of from fifty to sixty: arrive in September and go north by end of April.

—— *stellaris* (B.). Never seen in Corfu; very common in Albania.

—— *ralloides* (B.). Very common during its passage: arrives the first week of April, but does not remain longer than 15th of May.

—— *minuta* (B.). Arrives in Corfu in great numbers about the 1st of May: a few remain to breed, and though the young may be found in the autumn, I have never been able to discover the old birds at that season, and therefore conclude that they must return south at an earlier period.

Nycticorax ardeola (B.). Arrives the first week of April, does not remain.

Recurvirostra avocetta (B.). Occasionally seen in Corfu beginning of April: rare.

Ibis falcinellus (B.). More numerous some seasons than others: arrives the 10th of April, but disappears by the first week of May.

Numenius arquatus (B.). Arrives the beginning of September in great numbers.

Numenius phæopus (B.). Arrives the beginning of September in great numbers: not so common as the above.

Tringa subarquata (B.). These birds are common, arriving in autumn and mixing with the dunlins and other sandpipers during the winter, from which they are not easily distinguished: it is then the pigmy curlew of Bewick. In the month of May they assume their full plumage, and take their departure in the beginning of June.

——— *variabilis* (B.).
——— *minuta* (B.). } Very common during the winter: go north beginning of May.

Machetes pugnax (B.). Arrives the 15th of March: though the female is very common, the male is seldom seen*.

Totanus fuscus (B.). Very rare in Corfu.

——— *calidris* (B.). Very common during the winter.

——— *ochropus* (B.). Arrives the 15th of March: very common: does not remain beyond the end of April.

——— *hypoleucos* (B.). Common during the winter and spring.

——— *glottis* (B.). Common during the winter and spring.

Scolopax rusticola (B.). Arrives the first week of October: very numerous in Albania: returns by the 27th of March.

——— *major* (B.). Arrives the 1st of April: does not remain beyond the end of the month.

——— *gallinago* (B.). A few appear about the 20th of August, and by the 15th of November are seen in great numbers, particularly on the salt marshes at Butrinto, opposite Corfu, where I have known fifty couple to have been killed by one gun in a few hours. I have occasionally seen them throughout the summer, so one may conclude that they breed there.

——— *peregrina*. This bird is frequently found in Corfu, and may eventually prove only to be a variety of the *gallinago*; the only difference being in its size, which is much less, and the tail-feathers consisting of twelve instead of fourteen; in other respects it is perfectly similar.

——— *gallinula* (B.). Arrives about the 1st of November, and on its arrival is generally found in groups.

Rallus aquaticus (B.). Found in great numbers during all the winter months.

Gallinula crex (B.). Very rare: occasionally appears in April.

——— *porzana* (B.). Very common: sedentary: more abundant in spring.

——— *pusilla* (B.). Very rare in Corfu: arrives in April.

——— *chloropus* (B.). Very common: sedentary.

Fulica atra (B.). Sedentary: in winter they are seen in immense numbers.

Podiceps cristatus (B.).
——— *auritus* (B.).
——— *minor* (B.). } Very common in winter, arriving about the 1st of November and remaining till the beginning of April.

* It is possible that some of these supposed females may have been males in winter plumage, as the latter do not acquire their nuptial dress till the month of May.—H. E. S.

Sterna caspia (B.). Two of these birds were shot at Butrinto, opposite Corfu, by Capt. Sandham, R.E., 5th of April 1835.

—— *hirundo* (B.).
—— *nigra* (B.). } Common during the spring.
—— *minuta* (B.).

Larus argentatus (B.). Sedentary: very numerous. These birds are the only ones of the family that are abundant during the summer months.

—— *canus* (B.). Very common: does not breed.

—— *melanocephalus*. Very common in winter, when it may easily be known from the *L. ridibundus* in being entirely white, and having no black tips to the wings; about the 1st of March the head assumes a jet-black: disappear by the 1st of April.

Puffinus cinereus. Sedentary.

—— *anglorum* (B.). Sedentary.

Thalassidroma pelagica (B. ?). Rarely seen in these seas *.

Anser ferus (B.). Very rare; only having seen three of these birds in the winter of 1841–42.

Cygnus musicus (B.). Very rare: only one instance occurs of this bird having been shot in Cephalonia.

Anas tadorna (B.). Very common.

—— *boschas* (B.). Very common: breeds at Butrinto.

—— *strepera* (B.). Rare.

—— *acuta* (B.). Sometimes very common.

—— *penelope* (B.). Extremely numerous.

—— *querquedula* (B.). Extremely numerous: breeds in Corfu.

—— *crecca* (B.). Not so numerous as the above.

—— *clypeata* (B.). Very common.

—— *nyroca* (B.). Very common.

—— *fuligula* (B.). Very common.

Mergus serrator (B.). Very numerous in Corfu: arrives in November.

—— *albellus* (B.). Rare: not seen in Corfu, found in Santa Maura.

Pelecanus onocrotalus. Very numerous in Santa Maura and Butrinto, opposite Corfu, where they may be seen in flocks from fifteen to

* In a recent letter to myself Capt. Drummond remarks, that when the above list was drawn up "I had not seen the *Thalassidroma meletensis* discovered by my friend Signor Schembri at Malta, who stated that the *pelagica* is not known there, and that the *meletensis* breeds in great numbers on the rock of Filfola at the south end of the island of Malta. When in the Ionian Islands I was unfortunately unable to procure a specimen, but I have no doubt that what I saw were the *meletensis*, and that it is peculiar to the Mediterranean. On my passage home I saw plenty of the *meletensis*, but after passing the Gut [of Gibraltar] the *pelagica* made its appearance, and the *meletensis* was no longer seen. They are easily distinguished; the *meletensis* is, if anything, a little smaller, and has the lower half of the tail-feathers white as well as the rump." I have only to remark that this supposed new species of *Thalassidroma* (of which I can find no published account) must be the *T. pelagica* of the Prince of Canino, who states it in his 'Fauna Italica' to breed on rocks near Malta.—H. E. S.

thirty, sitting on the banks of the salt marshes all day long, sunning and preening themselves.

Carbo cormoranus (B.). Common: sedentary.

—— *pygmæus.* Found in Cephalonia, never in Corfu, but very numerous at Butrinto during the winter.

Summary.

	Species
Common to Ionian Islands and Britain....	157
Doubtful if same as British species	3
European, but not British	39
Peculiar to Ionian Islands	1
Total number of birds of Ionian Islands ..	200

It may appear remarkable that so large a proportion of these species should inhabit such opposite extremities of Europe as Great Britain and the Ionian Islands. The *faunæ* of these two regions are however much more distinct than the above numbers would appear to indicate, for many of the birds which abound in the Ionian Islands are of very rare and accidental occurrence in Britain, such for instance as *Cathartes percnopterus, Falco rufipes, Coracias garrula, Oriolus galbula, Cypselus alpinus, Glareola torquata, Ardea purpurea,* &c. —H. E. S.

LII.—*List of the Birds of the Island of Crete, from observations made during a stay of nearly two months, from 27th April to 18th June,* 1843. By H. M. Drummond, 42nd R.H. With Notes by H. E. Strickland, M.A.

[This list, which was also read to the British Association at Cork, is necessarily less complete than Capt. Drummond's list of the birds of the Ionian Islands, yet it is a remarkable instance of how much may be done in the short space of two months by an active and observant naturalist. This is the first contribution which has been made since the days of old Belon to the ornithology of Crete*, an island which, being the most remote extremity of Europe towards the south-east, may be expected to possess a peculiarly interesting fauna.—H. E. S.]

Vultur fulvus.
Cathartes percnopterus (B.).
Gypaëtus barbatus.
} Probably breed on the island. 1. Very numerous: 2. a few seen on the highest mountains: 3. common on the tops of the mountains.

Falco subbuteo (B.). Seen in flocks as late as 12th June, in chase of a large species of beetle, which they dextrously seize with their claws and devour on the wing: it probably breeds: only seen in the dusk of the evening, when several were shot.

* This island, to which the Saracens first gave the name of Candia, has been known to its inhabitants from the days of Minos to the present hour by no other name than Crete, and I rejoice to see that this venerable appellation is again coming into general use.—H. E. S.

Falco tinnunculus (B.). Breeds on the island.
—— *tinnunculoides.* Breeds: numerous.
—— *rufipes* (B.). Seen in large flocks as late as 30th May: probably breeds.
—— *haliaëtus* (B.). Only one individual seen, 29th April.
—— *milvus* (B.). A few seen on the Sfakian mountains.
—— *buteo* (B.). Breeds.
—— *rufus* (B.). Very common the end of April and beginning of May in the marshes.
Strix passerina (B.). Very numerous: breeds.
Corvus corax (B.). Common: breeds.
——— *cornix* (B.). Very numerous: breeds.
——— *monedula* (B.). Common at the foots of the mountains, where it breeds.
*Garrulus glandarius** (B. ?). A few seen on the Sfakian mountains, where they breed.
Pyrrhocorax graculus (B.). Very numerous on the tops of Mount Ida: breed there.
Coracias garrula (B.). Only one seen, 15th May.
Oriolus galbula (B.). Only two seen, the spring passage being nearly over.
Lanius rutilus† (B.). Very common: breeds.
Muscicapa grisola (B.). Common: breeds.
———— *albicollis.* Only one seen, 28th April.
Turdus merula (B.). Very numerous, particularly on the mountains, where it breeds.
——— *cyaneus.* Breeds on the mountains.
Sylvia turdoides. Only one seen, 1st May.
—— *phragmitis* (B.). Common: breeds.
—— *palustris.* Very numerous: breeds (found only in the olive-groves).
—— *luscinia* (B.). Very common along the rivers: breeds.
—— *melanocephala.* Very numerous: breeds.
—— *atricapilla* (B.). A few seen 29th April: does not remain.
—— *cinerea* (B.). A few seen 29th April: does not remain.
—— *trochilus* (B.). A few seen 29th April: does not remain.
Troglodytes vulgaris (B.). Seen only on the mountains, where they were pretty numerous: breed.
Saxicola œnanthe (B.). Very common on the mountain tops, where they breed.
——— *aurita.* Not quite so common as the above: found lower down on the mountains, where they breed‡.

* See the note, p. 414, *suprà.* Crete being further eastward than the Ionian Islands, it is probable that the jay of the former country is not the *Garrulus glandarius*, but *G. atricapillus.*—H. E. S.

† *L. rutilus* is the only one of the tribe found on the island, and *L. meridionalis*, though so common in Corfu and the other Greek islands where it breeds, was nowhere to be seen.—H. M. D.

‡ If the *S. aurita* was actually proved to breed in Crete, it would certainly indicate a specific distinction from *S. stapazina.* But see the note, p. 416, *suprà.*—H. E. S.

Saxicola stapazina. Rare: found and breed in the same places as the *S. aurita.*

——— *rubetra* (B.). A few seen the latter part of April, after which they disappear.

——— *rubicola* (B.). Very numerous: breed on the low grounds.

Accentor alpinus (B.). Seen only amongst the snow on the Sfakian range, where they breed.

Motacilla alba. One or two seen the end of April, after which they disappeared.

———— *flava* (B. ?). One or two seen the end of April: this bird is the common wagtail of the Mediterranean, but differs from the wagtail of England in having a black head.

*Anthus richardi** (B.). Found in dry rocky places, where it breeds.

——— *arboreus* (B.). A few seen the latter part of April.

Alauda cristata. Very numerous in every part of the island: breeds.

——— *arborea* (B.). Found in considerable number on the mountains, where they breed; none were seen lower down.

Parus major (B.). Common: breeds.

—— *cæruleus* (B.). Breeds here, but not so numerous as the last.

Emberiza melanocephala. None seen before 22nd of May, and then only a few; from observations since made, they seem to be confined to certain districts where they breed.

———— *miliaria* (B.). Very common: breeds.

———— *hortulana* (B.). Very common on the mountains, where they breed.

———— *cirlus*† (B.). Not very numerous: breeds.

Fringilla cisalpina‡. Common: breeds.

——— *cœlebs*§ (B.). Very numerous: breeds.

* This bird I have placed under the present denomination from its very strong resemblance, though it does not quite answer to Temminck's description of it, in having three streaks or bands of darkish olive taking their rise from the corner of the bill, instead of two, the first running from the nostrils through the eye above the auriculars, the second from the corner of the mouth passing under the auriculars, the third from the edge of the lower mandible parallel with the above; throat and breast yellowish ochre, darker on the latter, which is slightly sprinkled with a few light olive specks; sides, belly and vent of a rich cream-colour; upper parts olive tinged with rufous ash, darker on the head and scapulars. Greater and lesser wing-covers olive-brown, edged with light rufous. The tail consists of twelve feathers, and is blackish brown, excepting the two centre ones, which are lighter and shorter than the rest, edged with pale rufous, and the two side ones cream-colour on the outer webs and part of the inner. The first of these has the shaft white, the second black; the third feather from the outside is tipped with white; edge of bastard wing pure white; bill horn-colour, darker at the base; legs and feet pale brown; eyes hazel; length six inches three-quarters, breadth ten inches three-quarters. In the male and female, out of several specimens examined, little or no difference was found.

† *Emberiza cæsia*, though exceedingly common and breeding in the other islands, was not observed in Crete.

‡ *Fringilla domestica* is not found on the island, though it abounds in the Ionian Islands, where the *F. cisalpina* does not appear.

§ It is curious that this bird, which is so common in Crete, breeding and

Fringilla chloris (B.).
——— *cannabina* (B.).
——— *montium* (B.).
——— *carduelis* (B.).
} Common: breed in the island.

Upupa epops (B.). Two or three only seen, the end of April and beginning of May.

Merops apiaster (B.). Very common: most likely breeds on the island, as flocks were seen as late as 17th June.

Hirundo rustica (B.). Common: breeds.

——— *urbica* (B.). Not so numerous as the last: breeds on the mountains.

——— *riparia* (B.). Common in the beginning of May, but none seen latterly.

——— *rupestris*. Seen only on the mountains, and probably does not descend till winter, as it is very numerous at that time both in Corfu and Cephalonia, where it may be seen skimming over the marshes.

Cypselus alpinus (B.). Common: breeds.

——— *murarius* (B.). Very numerous: breeds.

Caprimulgus europæus (B.). A few only seen beginning of May.

Columba palumbus (B.). Breeds on Mount Ida, where they are pretty numerous.

——— *livia* (B.). Very common: breeds both in caves on the seashore as well as on the highest mountains, where they were found in great numbers.

——— *turtur* (B.). Very numerous the end of April and beginning of May during the passage, only a very few remaining to breed.

Perdix saxatilis. Very numerous: a covey of young birds was found as early as 29th May.

——— *coturnix* (B.). Not so numerous here as in some of the other islands: a few remain to breed.

Glareola torquata (B.). Only two or three were seen, one as late as 12th June.

Œdicnemus crepitans (B.). Common: breeds.

Charadrius minor (B.). In great numbers in April; none seen after 15th May.

Ardea cinerea (B.). Common: breeds.

—— *purpurea* (B.). Very common in the spring; none seen after the middle of May.

—— *garzetta* (B.). Very common in the spring; one seen as late as 10th June in company with a spoonbill.

—— *ralloides* (B.). Very common; none seen after the middle of May.

—— *minuta* (B.). Very common; none seen after the middle of May.

Nycticorax ardeola (B.). Two or three only, beginning of May.

probably remaining the whole of the year, is not found in Corfu during the summer months; and as far as I can ascertain, in none of the Ionian Islands during that season. It is there a bird of regular passage, arriving, along with the robin red-breast, in considerable numbers about the first week of October, and not taking its departure till the end of February or beginning of March.

Platalea leucorodia (B.). Only one seen, which was shot 10th June and proved to be a female, so that they probably breed on the island.

Ibis falcinellus (B.). Two or three seen the latter part of April.

Numenius arquatus (B.). Two or three seen the latter part of April.

Tringa minuta (B.). Very common the latter part of April; none seen after the 15th May.

Machetes pugnax (B.).
Totanus calidris (B.).
——— *ochropus* (B.).
——— *hypoleucos* (B.).
——— *glottis* (B.).
} Very common the latter part of April; none seen after the 15th May.

Scolopax major (B.).
——— *gallinago* (B.).
} A good number were seen the latter part of April, when six couple were shot one day; none seen afterwards.

Gallinula porzana (B.). Common: breeds.

——— *pusilla* (B.). Common end of April; none seen afterwards.

——— *chloropus* (B.). One or two only seen.

Sterna hirundo (B.). One only, 18th June.

——— *nigra* (B.). Common: breeds.

Larus argentatus (B.). Very common: breeds.

——— *melanocephalus*. One only, 28th April.

Puffinus cinereus. A few seen on the coast, middle of June.

——— *anglorum* (B.). Common: breeds.

Thalassidroma pelagica (B.). Several were seen off the island on 19th June.

Anas querquedula (B.). A few seen in pairs as late as middle of June.

——— *nyroca* (B.). A few seen in pairs as late as middle of May.

Pelecanus onocrotalus. One seen beginning of May; probably com mon in winter.

Carbo cormoranus (B.). Common: breeds.

Summary.

	Species
Common to Crete and Britain....	84
Doubtful if same as British species	2
European but not British........	19
	105

All the birds in this list have been noticed also in the Ionian Islands, except the four following:—*Accentor alpinus, Anthus richardi, Fringilla cisalpina,* and *Platalea leucorodia*.—H. E. S.

LIII.—Excerpta Zoologica, *or abridged Extracts from Foreign Journals.* By Dr. Felix von Bærensprung.

Vegetation upon Living Animals.

Within the last few years several observations have been made on certain of the lower classes of vegetable productions, the parasitical occurrence of which on living animals gives

rise to various diseases. Among the most complete researches on this subject are those of Bassi and Audouin on the *Muscadina*, a contagious disease of the silkworm (Ann. des Sc. Nat. 1837, 1838), and those of Schœnlein on the contagious ringworm (*Porrigo lupinosa*) of man. From these inquiries our views respecting miasma and contagion have obtained considerable elucidation, as it was possible in those cases to isolate the contagious matters and to determine their vegetable nature. A third fact also of this class, viz. the occurrence of parasitic fungoid formations in the lungs and in the air-cells of birds, has been observed by Montagu and Owen (see 'Annals,' vol. ix. p. 131, and vol. viii. p. 230) and more recently by Müller and Retzius, as has already been communicated in these 'Annals' for 1842. Connected with these observations are the following, which have been more recently published.

Dr. Hanover and M. Stilling have published several communications on contagious confervoid formations on frogs and on the water salamander (Müll. Archiv, 1839, p. 338; 1841, p. 279; and 1842, p. 73). Dr. Hanover first observed a mucous efflorescence form on *Triton punctata* which had been used for dissection and had lain some time in water; on submitting this efflorescence to microscopic examination, it proved to consist of a very simple conferva. The mass was formed of numerous more or less ramified tubes of various diameter which attained the length of an inch. The cavity in their interior was in some continuous, in others distinctly divided into chambers by means of cellular partitions; it was filled with innumerable black corpuscles, which swam about in the interior in a very lively manner and with an appearance of volition. The motions induced M. Stilling to ascribe an animal and not a vegetable nature to the efflorescence. He considered the black corpuscles to be the eggs of a species of hair-shaped infusorium which became developed in great quantity during putrefaction, and believed that these eggs were transported by the circulation of the blood and were thus deposited at certain places, where he then supposed the tubes to be formed by a secretion of fibrine, and which were, so to speak, polypidoms (*Keimstöcke*) in which the eggs attained their development.

Dr. Hanover proved the incorrectness of this view in his second paper on the subject, and placed beyond doubt the vegetable nature of the efflorescence by the observation of its development and the formation of sporules*.

* The free and apparently voluntary motion of the sporules of many algæ, fungi and lichens has already been observed so often, that it can no longer be classed among the surprising phænomena. Very recently Prof. Gœppert in Breslau has described it in *Nemaspora incarnata*, and has shown

What is most interesting in these efflorescences is, that they not only grow on the bodies of dead animals, but may also be transferred to those of living ones. If, for instance, a living animal which was wounded in any part of its body happened to be contiguous, it was also attacked by them, and the conferva vegetated from the wound in luxuriance, deriving its nourishment at the expense of the animal, which fell off perceptibly in condition and sometimes died. Moreover, direct attempts at inoculation proved successful; for a small quantity of conferva conveyed into a cuticular wound vegetated abundantly, and after some time fell off together with a portion of the skin.

These experiments were made by Dr. Hanover, and were subsequently confirmed by M. Stilling. They show that we have here to do with a true vegetable contagium, similar to that of the *Porrigo lupinosa* and the *Muscadina*, but with this difference, that in the one case the air is the diffusing medium, while in the other it is the water.

The conferva itself has been called *Achlya prolifera*.

Another contribution to the history of these parasitical vegetable formations was adduced by Dr. Hanover in Müll. Arch. 1842, p. 281, "*on Entophyta upon the mucous membranes of the dead and living human body*."

The little plant here described has the greatest similarity to the mucedinous fungus of the *Porrigo lupinosa*, since it consists of the same simple or ramified tubes; but it appears only to increase by division; as sporules, such as they occur in *Porr. lupinosa*, were never observed. This fungus differs from most of the parasitical plants that have hitherto been observed, from its not growing upon the surface but in the interior of the body, viz. upon the mucous membrane of the cavity of the mouth and alimentary canals of man. Among seventy bodies which had died of the most varied diseases it was found in fourteen, most frequently after *typhus abdominalis*, where Langenbeck had already observed something of a similar nature. After the occurrence of this filamentoid fungus in the dead body had been confirmed, it was likewise found in the living; it was met with in the various sedimentary deposits on the tongue and lips in *typhus**, in *erysipelas*, and in the stomach

that even specimens of this plant that had been collected twenty years ago still exhibited the same motion of their sporules (Müll. Arch. 1842, p. 145). The motion of the spermatozoa is in fact quite a similar phænomenon, and the view that they are independent living animals can scarcely be maintained any longer since their origin from cells has been repeatedly proved, especially by R. Wagner and by M. Kölliker.

* The tartar deposited in health about the teeth consists in great part of a fine filamentous fungus, according to some authors; but Prof. Mitscherlich and M. Mandl, prove it to consist of an infusorium.—Ed.

both in new-born children and in adults. It has also been once detected in the flocculent sediments of diabetic urine.

This filamentoid fungus is frequently accompanied by the fermentative fungus of the yeast (*Coniomyces cerevisiæ*), and also by the peculiar fermentative fungus of diabetic urine. Both have also been observed in dead and living persons.

In diabetic urine which was undergoing fermentation, a fermentative fungus was also developed, which however was found to be specifically distinct from that of the yeast, the individual cells being more elongate, and containing generally from two to three nuclei. When yeast is added to fresh diabetic urine it likewise undergoes fermentation, but only the fermentative fungus of the yeast is then evolved, not that of the diabetes.

The great resemblance between the fermentative and some forms of the filamentoid fungi, their contemporaneous appearance, and especially their occurrence in the living body, point to a remarkable analogy between the process of fermentation and several forms of disease, especially those produced by contagion,—an analogy which has already been established by Liebig in a chemical point of view*.

Dr. Hanover has endeavoured to collect together the scattered literature on the occurrence of parasitic plants upon living animals†, whence it results that this phænomenon may occur in all classes of animals. They have been observed,—

1. *In Man.*—The vegetable nature of the *Porrigo lupinosa* was first shown by Schœnlein and was then confirmed by various persons; thus recently in *Tinea favosa* by Dr. Gruby, Müll. Arch. 1842. Hanover observed the filamentoid fungus of the mucous membrane, and at the same time Bennet (Trans. of the Roy. Soc. Edinb.) has detected a filamentoid fungus in the sputa and lungs of a man. J. Goodsir has described a vegetable (*Sarcina*) occurring in the stomach of persons affected by water-brash. Mr. Busk has published some notes on the same (Microscopic Journal).

2. *In Mammalia.*—Serrurier and Rousseau, l'Institut, 1841.

3. *In Birds.*—Fungoid formations in the lungs and air-cavities of birds have been observed by Mr. Owen in *Phœnicopterus ruber*, Phil.

* This view has received considerable confirmation from the recent observations of the celebrated chemist Prof. Mitscherlich, communicated at p. 300 of this Journal; and also by the curious observations of M. Blondlot, published in the 'Comptes Rendus' for Sept. 11, 1843.—W. F.

† This has been admirably done by Dr. J. H. Bennett in an elaborate memoir published in the Transactions of the Royal Society of Edinburgh, vol. xv. part 2. The conclusions however drawn from the facts stated in the present article relative to the important offices which these remarkable productions are intended to fulfill in nature, will be found to be somewhat different, and well justify the publication of this paper, which was received from our friend seven months ago.—W. F.

Mag. 1833; Deslongchamps in *Anas mollissima*, Ann. des Sci. Nat. 1841; Serrurier and Rousseau in several other birds; Johannes Müller and Retzius in *Falco rufus* and in *Strix nyctea*, 1842, Müll. Arch. 1842.

4. *In Amphibia.*—Serrurier and Rousseau in *Testudo Indica*; Hanover and Stilling in salamanders and frogs.

5. *In Fish.*—Ehrenberg observed a conferva (*Tremella meteorica*) as a disease upon *Salmo eperlanus*; Bennet a conferva upon *Cyprinus auratus*, Ann. Nat. Hist. vol. ix. p. 66.

6. *In Insects.*—Under this head come the observations of Bassi and Audouin on the Muscadina of the silkworm.

Sphæria sinensis grows upon a caterpillar in China, and is there employed as a medicine: Westwood in Annals of Nat. Hist. 1841*.

Hygrochrosis intestinalis has been detected in the intestinal canal of *Blatta* by Valentin (Repertorium, 1836).

The confervoid vegetation on flies has been frequently observed and described in particular by Ledermüller, Wrisberg, Spallanzani, O. F. Müller, Lyngbye, Gruithuissen, Carus, Gœthe, Meyen, and Nees von Esenbeck.

Achlya prolifera, of the water salamander, has also been found to infest the bodies of dead flies.

7. *In Mollusca.*—Laurent (l'Institut, 1839) has observed a fungus in the eggs of *Limax agrestis*.

Coleoptera.

The genus *Byrrhus* has been monographed by Steffani (Tentamen Monographiæ Byrrhorum, dissertatio inaug. Berol. 1842). The author describes thirty-five species, of which eight are new, arranged in five genera, among which one is new.

With regard to the geographical distribution of these insects, it is found that they all inhabit only the northern temperate zone, in which they are distributed as follows:—

	Number of species.	Europe.	America.	Asia.
Byrrhus	27	23	5	2
Syncalypta	3	3	0	0
Podiloptorus	1	1	0	0
Simplocaria	2	2	0	0
Amphicyrta	2	0	2	0
Genera and species..	35	29	7	2

There are four species which belong exclusively to Europe, five to North America, and one to Asia.

An accurate description of the larva of *Byrrhus* has recently been given by Erichson in his 'Archiv,' vol. i. for 1842, p. 104.

* See a paper in Hooker's 'London Journal of Botany' on the species of *Sphæria* which grow on larvæ and pupæ.—Ed.

Chætopodes.

Several additions have been made to the history of the *Chætopodes*, Burm. (*Terricolæ*, Cuv.). Henle described several years ago a new genus allied to *Lumbricus*, to which he applied the name of *Enchytracus*; it occurs near Berlin in moist ground, and differs from *Lumbricus* by the white colour of the skin, the pale colour of the blood, and by its much smaller size.

In a treatise lately published by Hoffmeister (De Vermibus quibusdam ad genus Lumbricorum pertinentibus, diss. inaug. cum tab. 2. Berol. 1842), we are made acquainted with another new genus, *Sænuris*: the animal lives at the bottom of small ditches near Berlin, where it occurs buried in the mud with the posterior extremity of the body, while the front portion projects freely and floats about in the water. From this aquatic mode of life it approaches to the genus *Tubifex*, Lam., from which however it decidedly differs by its far greater size, four series of fasciculi (*Tubifex* has only two), and by the absence of the peculiarity of forming tubes in the mud. The following are the generic characters:—

Sænuris. Corpus teres, distincte annulatum annulis raris, quadrifariam ternis ad senis pedicellis inæqualibus aculeatum, numerus annulorum 190—160. Diaphragmata arcta; color sanguinis ruberrimus. Ventriculus musculosus nullus.

S. variegata. Labro superiore dilatato, antice acuminato. Long. 3‴.

Lumbricus variegatus of O. Mueller is probably synonymous with this species. A careful anatomical dissection indicated essential differences from the allied genera.

In the same memoir we further find observations on the genus *Lumbricus* itself: while all the older zoologists are only acquainted with a single species, *Lumbricus terrestris*, Savigny (Déscript. de l'Egypte) has made twenty new species from that one; and Dugés has brought the number up to thirty-five.

Hoffmeister, who examined the earthworms of the neighbourhood of Berlin, considers that he is able to distinguish with certainty three species which are characterized by external characters, and also by their habit. One of these species agrees with the *L. anatomicus*, Dug.; the other two are new, *L. agricola* and *L. olidus*.

C. Vogt has recently described another new genus, which is more allied to the Naiads (Müller's Archiv, 1841, p. 36), under the name *Matzia heterodactyla*. The long body of the animal is indistinctly divided into rings; each of the rings has on the ventral side two warts, each of which is furnished with from two to ten bristles. The animal is, from its parasitic habit, very remarkable, living as it does in the mantle-cavity of *Ancylus fluviatilis*; the length of the animal amounts at the

furthest to $1\frac{1}{2}'''$. Although Vogt describes this annelide as new, it appears to be identical with *Chætogaster*, Von Baer (Beiträge zur Kentniss der niederen Thiere, tab. 2.). Von Baer also found his *Chætogaster* parasitic on freshwater mollusca; not on *Ancylus* it is true, but on *Limnæus*, *Planorbis*, and *Physa*. In size, colour and form it agrees perfectly with the *Matzia*, and from the description and figure there cannot be the slightest doubt as to the identity of both animals. I have also found in the neighbourhood of Berlin, in the mantle-cavity of young specimens of *Planorbis communis*, an annelide which agrees exactly with Vogt's representation of the *Matzia heterodactyla*. The latter name must be abandoned, and that of *Chætogaster*, being the oldest, adopted.

With respect to the more accurate relations of affinity of this genus, the spiny feet affixed to the flesh-hooks, and the mode of propagation by means of gemmation and division, connect it with the *Naiades*, from which however it differs in the absence of eyes. It is most nearly allied to *Acleosoma* and *Pristina*, Ehrenb. (Symbol. Phys. Evert.).

BIBLIOGRAPHICAL NOTICES.

Annales des Sciences Naturelles.

Feb. 1843.—*Zoology*.—The remainder of M. Joly's very valuable paper on *Caridina Desmarestii*. Among the results of his research are the following important conclusions: the *Caridina* quits the egg under a different form from that which it presents when adult, wanting many organs which afterwards are fully developed. The changes which it undergoes are *true metamorphoses*, much more complete metamorphoses than those presented by Orthopterous, Hemipterous, and some Neuropterous insects. A comparison of M. Joly's observations with those of J. V. Thompson and Capt. Du Cane leads him to conclude, that almost all, if not all, Decapodous Crustacea exhibit similar transformations.—Dr. Martins on *Arvicola nivalis*, a new species from the region of perpetual snow in the Swiss Alps.—Andral and Gavarret on Respiration.—A translation of Mr. Bowman's admirable memoir on the structure and use of the Malpighian bodies of the kidneys.

Botany.—Dr. Montagne's descriptions of Exotic *Cellulares*, continued.—M. Nageli on Fungi living in the interior of vegetable cells (from the 'Linnæa'), with a good plate.—Professor Morren on the movements and anatomy of the labellum of *Megaclinium falcatum* (extracted from the 15th vol. of the new memoirs of the Brussels Academy).—Spach's monograph of the genus *Amygdalus*. Out of seventeen species thirteen are inhabitants of Asia only, one of Europe only, one common to Europe and Asia, and two doubtful. Nine of these are new. M. Spach also enumerates seven dubious species.

March.—*Zoology*.—M. Leon Dufour on the Liver of Insects. A long and important paper with excellent plates.—M. Quatrefages

on a new kind of Phosphorescence observed in certain Annelides and *Ophiuræ*. The author shows that the light in these cases proceeded from the muscular tissues of the animals.

Botany.—On the growth of *Pinus sylvestris* in the north of Europe, by MM. Bravais and Ch. Martins.—Monograph of the genus *Ebenus*, by Count Jaubert and Ed. Spach. Of the species described two are European, seven Asiatic and one African. Seven out of the total ten are new. There is appended a description of a new genus, *Ebenidium*, intermediate between *Ebenus* and *Anthyllis*. *Ebenidium lagopus*, a plant from Southern Persia, is the only species.—Remarks on the anatomical structure of *Melocactus*, by F. A. W. Miquel (translated from the 'Linnæa').—A revision of the species of *Chamærrhodos*, by Prof. Bunge.—On the genus *Hypochæris*, by E. Regel (from the 'Linnæa').—A translation of M. Gœppart's memoir on the ligneous knots in *Abies pectinata*.

April.—*Zoology.*—A translation of Siebold's paper on the organ of Hearing in the Mollusca.—M. d'Orbigny on the comparative normal position of Bivalve Mollusca. The opinions expressed in this paper are rather fanciful than important.—A translation of Prof. Owen's great memoir on the *Mylodon*.

Botany.—Note on *Cambium*, by MM. Mirbel and Payen.—M. Mohl's researches on the Cuticle of Plants (from the 'Linnæa').—Dr. Léveillé on Fungi of the neighbourhood of Paris.—Count Jaubert and M. Spach on the Oriental species of *Leobordea*.—Dr. Montagne's Fourth Century of new Exotic *Cellulares*.

May.—*Zoology.*—General Considerations on the Palæontology of South America, compared with European Palæontology, by M. Alcide d'Orbigny. A very interesting paper by a naturalist, whose works promise to rescue the palæontology of the Invertebrata from the obscurity which pervades it, in consequence of having remained so long in the hands of persons whose knowledge was geological rather than zoological. Among the conclusions drawn by M. d'Orbigny from the facts on which this paper is founded, are the following: 1st, that "beings, taken as a whole, have, following the chronological order of faunæ characteristic of formations, progressed in America as in Europe from simple to complicated." [This conclusion will hardly bear criticism.] 2ndly, no transition being evident among specific forms, beings appear to have succeeded each other on the surface of the earth, not by *passage*, but by extinction of existing races and by the creation of new species at each geological epoch: 3rdly, animals are divided into zones according to geological epochs, each of which represents a distinct fauna having the same palæontological aspect and composed of the same generic forms both in Europe and America, and also containing certain species common to both: 4thly, M. d'Orbigny regards such a state of things as indicating, among the older formations, a uniformity of temperature and a general shallowness of the seas: 5thly, after the cretaceous æra the influence of climate commences, consequent on the diminution of the internal heat of the globe; uniformity of distribution disappears, and local faunæ are multiplied.—Memoir on the *Eolidina paradoxum*, Quat., by M. A. de Quatrefages (with a fine en-

graving). The following is the character of the genus *Eolidina*: "Four tentacula; eyes at the base of the posterior tentacula; branchiæ arranged symmetrically in transverse rows on each side of the median line; *anus posterior, dorsal*; genital orifice on the right side, a little in advance of the posterior tentacula; foot large, enlarged in front, extending beyond the body behind." "*Species, E. paradoxum.* Superior legs slightly prominent; anus very small; genital orifice not very evident; two reddish-brown eyes; anterior tentacula twice as large as the posterior; colour variable (pale orange or gray). Length ten to twelve millimetres. Inhabits coasts of Normandy under stones at low-water." The author describes its anatomy and physiology at length, and concludes by a consideration of its zoological relations. This is a memoir of very great interest, and should be carefully perused by every British malacologist.—An extract from a work by M. Matteucci on animal electricity.

Botany.—M. Gustave Thuret on the locomotive organs of the spores of Algæ. By the employment of opium and iodine the author has been enabled to arrest and examine the ciliary organs which cause the spores to move. Of these organs he distinguishes four types. The most simple is seen among the Confervæ, in which the extremity of the spore, unprovided with endochrome, forms a rostrum, bearing two cilia or filiform tentacula, slightly exceeding it in length. The motions of these spores recall those of the animalculæ which are found in the anthers of *Chara*. Light affects them. There is a rose-coloured point near the rostrum like that seen in certain Infusoria. A second form of spore is seen in *Chætophora elegans*, the spores of which are provided with four cilia. A third type is met with among the *Proliferæ*, in which the spores are oval, with a rounded rostrum bearing a crown of filiform tentacula. A fourth is seen in *Vaucheria*, in which the spore is an ovoid vesicle entirely clothed with cilia. M. Thuret gives an interesting account of the germination of the spores, confirming the observations of Unger, and shows that many species of *Vaucheria* are varieties of one form. Good plates accompany this paper.—*Monographia Lycoperdineorum*, by Dr. Vittadino (in the Turin 'Transactions').—Monograph of the genus *Spartium*, by M. Spach. Ten species are enumerated, of which nine are African (mostly from the Canaries) and one common to Africa and Asia.—Observationes in Acanthaceis Horti Vratislaviensis, by Nees ab Esenbeck (from the 'Linnæa').—Karelin and Kirilow on new genera of Russian plants (from the 'Bulletin' of the Moscow Society).—Description of *Zamia Loddigesii* (*Z. serrulata*, Catal. Loddig. n. 1841), by M. Miquel.—Baron Melicocq on the vegetation of the banks of the Meuse.—Review of M. Holandre's 'Flora of the Moselle.'

June.—*Zoology.*—M. Kolliker on the seminal fluid of Crustacea and Cirrhipeda (translated from the author's essay published in German).—Extract from the memoir by MM. Dumas, Boussingault and Payen, on the Origin of Fat.—Huber's paper on the larva of a *Lyda* (see 'Annals,' May 1843).—M. Costa on the integuments of *Synaptæ*.

Botany.—M. A. Steinheil (the late) on opposite leaves which become alternate by union.—Arendt on the capillary action of hairs (from the 'Flora').—M. Desmazières on Cryptogamia new to France.—M. Tulasne on French *Lycoperdaceæ.*

July.—*Zoology.*—M. Serres on the human allantoid.—M. d'Orbigny on the Gasteropoda of the Cretaceous system. Of 325 species found in the cretaceous strata of France, 250 are new. Out of the total, 81 species belong to the Neocomian (the lowest portion of the Lower Greensand) and 9 to the "Aptien," which two divisions form together the "Étage Néocomien" of D'Orbigny, a name equivalent to the Lower Greensand of Dr. Fitton. To the "Albien," *i. e.* the Gault, belong 77 species; to the "Turonien," *i. e.* Upper Greensand, 134; and to the "Senonien," *i. e.* white chalk, 24. Each geological group is marked by an assemblage of peculiar species. The new names given by M. d'Orbigny to the groups will appear to most geologists useless and inconvenient: it is a relic of an old, but very bad habit of French naturalists.—Experimental researches on Inanition, by Dr. Chossat.

Botany.—M. Mirbel on the anatomy of the Date-Palm.—M. Gaudichaud's reply to M. Mirbel.—M. A. Meyer on the *Daphnaceæ* (from the 'Bulletin' of the Moscow Academy).—M. Bojer on new plants from the South African Islands.—M. Schrenk on new *Chenopodiaceæ* and *Statices* (from the 'Bulletin' of the Moscow Academy).

Aug.—*Zoology.*—M. Matteucci on muscular electricity, 2nd part. —M. Bischoff on the detachment and fecundation of the human egg and of the eggs of Mammalia.—Physiological studies on menstruation, by M. Raciborsky.—M. Lereboullet on the *Ligidium Persoonii* of Brandt. With plates.

Botany.—Note on the distinctive characters which separate vegetables from animals, and on mineral secretions in plants, by M. Payen. The author, by chemical analysis, comes to the same conclusions which M. Decaisne arrived at by organographical research, viz. that *Corallina officinalis, Halimeda, Opuntia* and their allies are vegetables and true Algæ.—Dr. Montagne on the tribe of *Podaxineæ,* and on *Gyrophragmium,* a new genus of that tribe.—Conspectus generis Gaillonia, by Count Jaubert and M. E. Spach.—On some new plants of Abyssinia, by M. Raffineau Delile.—M. Bojer's descriptions of rare plants from the islands of Southern Africa.—Prof. Bernhardi on the metamorphosis of plants (from the 'Flora' of 1843).

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

Dec. 27, 1842 (*continued*).—Richard Owen, Esq., Vice-President, in the Chair.

Mr. Fraser exhibited a specimen of the *Galago Senegalensis,* procured at Cape Coast, Western Africa, and a new species of Shrew from Fernando Po, which he characterized as follows:—

Sorex (Crocidura) Poensis. *Sor. obscurè fuscus, corpore subtùs*

cinereo, pedibus nigrescentibus; auribus parvulis, distinctis; caudâ corpore breviori pilis obscuris adpressis, et setis longioribus adspersis.

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	3	3
——— *caudæ*	1	10
——— *tarsi digitorumque*	0	6
——— ab apice rostri ad basin auris	0	10

Hab. Clarence, Fernando Po.

This species somewhat resembles the *Sorex varius* of Smuts, but is of a deeper hue. The upper parts of the body are of a deep brown colour, rather indistinctly variegated with greyish; the body beneath is grey, but slightly washed, as it were, with dirty yellow. The ears are distinct, that is, not hidden by the fur, as in *S. tetragonurus* and its allies, and the tail has long bristly hairs interspersed with the short adpressed fur, as in the subgenus *Crocidura*, Wägler.

The specimen was taken in a trap baited with flesh, on the elevated land of Point William.

Mr. Fraser observed that the specimen exhibited of *Galago Senegalensis* was shot at Cape Coast, Western Africa, in a tamarind tree, near the top of which he found its nest: this was composed of loose leaves arranged in the fork of a branch. The eyes were large and prominent, and the movements of the animal were slow, and consequently very unlike the true Lemurs.

Specimens of the *Galago Alleni* and *G. Maholi* were placed on the table for comparison.

A paper was then read, from M. Petit de la Saussaye, containing descriptions of new species of Shells, belonging to the genus *Auricula*, collected by H. Cuming, Esq.

Auricula tornatelliformis. *Aur. testâ oblongo-acutâ, sub epidermide flavescente albidâ, transversìm tenuissimè striatâ, et rugis longitudinalibus levissimis obsoletè granulosâ; spirâ conico-acutâ, lucidâ; anfractibus octonis subconvexis, ultimo magno supra medium ventricoso; columellâ infernè biplicatâ; labro supernè arcuatim emarginato.*

Long. 24 millim.; larg. $10\frac{1}{2}$ millim.

Hab. Tanhay, isle of Negros, Philippines. Found at the roots of mangrove-trees.

Auricula Doliolum. *Aur. testâ ovatâ, transversìm tenuè et regulariter sulcatâ, striis longitudinalibus et irregularibus subpunctatâ, sordidè rufo-fuscâ, ultimo anfractu pallidiore albido-cinerascente, angustè plùs minùsve fasciatâ; anfractibus* 6-7*; aperturâ ovatâ intùs fusco-purpurascente; columellâ biplicatâ, supernè obsoletissimè dentatâ; umbilico rumali; labro albo, intùs incrassato, tridentato, dente mediano majori, inferiori obsoleto.*

Long. 10 millim.; larg. $5\frac{1}{2}$ millim.

Hab. Sinait, province of North Ilocos, island of Luzon. Found on decayed wood, salt water.

Auricula Reclusiana. *Aur. testâ ovato-oblongâ, griseo virescente,*

spirâ conicâ, apice obtusâ, erosâ; anfractibus senis, planiusculis, unoquoque in superiorem imbricante, sub suturâ depressiusculo; umbilico nullo; aperturâ subovatâ intùs fusco-purpurascente; columellâ triplicatâ, plicâ superiori, latiori, lamelliformi, mediâ mediocri, inferiori minori; labro lævigato, intùs zonâ albâ, subcalloso.

Long. 16 millim.; larg. 8 millim. vix.

Hab. Island of Tumaco, West Colombia.

Auricula piriformis. *Aur. testâ subpiriformi, lævigatâ, fuscâ, sub epidermide viridi-cinerascente; anfractibus 7-8; spirâ breviconicâ, rotundatâ, apice acuto, nigro; aperturâ oblongâ, intùs fusco-violaceo; columellâ 5-plicatâ, plicis superioribus obsoletis, medianâ robustiori, lamelliformi, inferiori robustâ, subascendente, posticè circulari; labro acuto, pallidè emarginato, intùs 2-6 tenuiter striato.*

Long. 20 millim.; larg. 9 millim.

Hab. Tumaco island, West Colombia.

The number of striæ or folds on this shell varies, but most frequently there are five.

Auricula Ceylonica. *Aur. testâ ovatâ, supernè obtusè angulatâ, glabrâ fusco-viridescente, fasciis albis vel cinereis angustis cinctâ, anfractibus 8-9, planulatis; spirâ conico-depressiusculâ, apice nigrescente; columellâ triplicatâ, plicâ superiori albâ, crassiusculâ, lamelliformi, subtùs parvulâ, inferiori circulari; labro acuto, longè et profundè intùs sulcato, ad marginem fusco, lævi.*

Long. 15 millim.; larg. 10 millim.

Mr. Cuming possesses specimens which are of large size.

Hab. Ceylon.

Very fine striæ are sometimes perceptible upon half of the last whorl of this shell; the base of the columella is of a livid fawn-colour.

Auricula pulchella. *Aur. testâ parvulâ, ovato-acutâ, nitidâ pellucidâ albicante, transversìm fusco-zonatâ, lineis longitudinalibus rectis seu undulatis, æquidistantibus, zonas transversas secantibus, eleganter pictâ; anfractibus 6-7; spirâ conico-acutâ, fuscâ, apice mammillari; columellâ triplicatâ, plicis superioribus parvulis, approximatis, inferiori majori, subhorizontali; labro acuto, intùs tenuiter striato.*

Long. 6 millim.; larg. 3 millim.

Hab. St. Nicolas, isle of Zebu (Philippines).

Jan. 10, 1843.—Richard Owen, Esq., Vice-President, in the Chair.

A portion of a letter from the Rev. W. C. Cotton, addressed to Professor Owen, was read. This letter is dated Waimate, near the Bay of Islands, New Zealand, July 11, 1842, and the portion read refers to the remains of a gigantic bird in New Zealand. The Rev. Mr. Cotton observes, that upon meeting with the Rev. Mr. Wm. Williams, whose missionary station is at the East Cape, Bay of Islands, "I spoke to him about the gigantic New Zealand Bird, of which you described a single bone. Oddly enough, he had a basketful of the bones in the next room, which he immediately

showed to me. He has sent two cases of them to Dr. Buckland, together with a long letter, fully detailing the circumstances under which they were found. I have no doubt but that he will ere this have communicated the letter to you, that is, should it have safely arrived. The bones are very perfect, not at all fossilized; and have been buried in the mud of freshwater streams communicating with high mountains. Mr. Williams had bones of thirty different birds brought to him in a short time after he set the natives about searching for them. One of the largest leg-bones, which measures two feet ten inches, and which has been sent to Dr. Buckland, leads him to think that the bird must have been sixteen feet high! A clergyman who came out in the Tomatia with us is going to be located in the Wairoa, a river about seventy miles south of Poverty Bay, a locality in which these bones have been found in the greatest plenty, and I will commission him to save for me all he can in case you should not have any in the distribution which Dr. Buckland is authorized by Mr. Williams to make. No bones of the wings have been found. The natives have some odd traditions about it, which you will see in the letter. Strangely enough, after Mr. Williams had obtained the bones, he heard of the bird as having been seen by two Englishmen in the Middle Island. They were taken out by a native *at night* to watch for the bird, which he had described to them; they saw it, but were so frightened that they did not dare to shoot at it, though they had gone out expressly to do so. After this I should not be surprised if the Zoological Society were to send out an army to take the monster alive, for alive he most certainly is in my opinion."

A paper was then read from M. Petit de la Saussaye, in which the author describes the following new species of Shells, placed in his hands for that purpose by Hugh Cuming, Esq. Among these, M. Petit observes, are several which in his opinion form a new little group, possessing well-marked characters, and which might be regarded as a subgenus, for which he proposes the name *Elasmatina**.

These shells, which are all terrestrial, form a portion of the great family *Helicidæ*, and appear to be confined to certain islands in the Pacific Ocean. They are of small size, transparent and fragile, and their columella is always furnished at least with one tooth, and sometimes with several teeth. The chief characters are thus expressed by the author:—

Elasmatina.

Testa ovata, seu turrita, fragilis, pellucida; columella uni- vel pluridentata, dentibus lamelliformibus; labrum tenue, acutum.

Elasmatina subulata. *Elasm. testâ conico-elongatâ, cylindraceâ, pellucidâ, dilutè corneâ; anfractibus decennis, convexis, suturâ lineari, impressâ; apice obtuso; aperturâ obliquè obovatâ; columellâ dente lamelliformi intùsque decurrente instructâ; labro tenui, acuto.* Long. 6 mill.; larg. 2 mill.

Hab. Island of Opara, Society Islands.

Found by Mr. Cuming in decayed grass.

* From ἔλασμα, *lamella*.

Elasmatina Cumingiana. *Elasm. testâ ovato-conicâ, pyramidatâ, pellucidâ, dilutè corneo-fuscescente; anfractibus* 10–11, *subplanulatis, ultimo subangulato; aperturâ semilunari, angustatâ; columellâ biplicatâ; plicâ superiori obsoletè lamelliformi; inferiori arcuatâ, lamellosâ; labro tenui, acuto.* Long. 6 mill.; larg. $3\frac{1}{4}$ mill.

Hab. Island of Juan Fernandez.

Found by Mr. Cuming on dried herbage.

Elasmatina Reclusiana. *Elasm. testâ oblongo-conicâ, pellucidâ, corneo-fuscescente; anfractibus* 9–10, *planiusculis; aperturâ semilunari; columellâ basi contorto-plicatâ, plicâ lamellosâ; labro tenui, acuto.* Long. 5 mill.; larg. 2 mill.

Hab. Island of Mas afuera, coast of Chili.

Found by Mr. Cuming under móss in damp situations.

Elasmatina globosa. *Elasm. testâ ventricoso-conicâ, pellucidâ, luteo-virescente; anfractibus* 6–7, *planiusculis, ultimo maximo, ventricoso, pallidiore; spirâ conico-acutâ; aperturâ semilunari, ringente; columellâ suprà medium dente lamelliformi instructâ, dente subtùs marginato, interdum duplicato, ad basim plicato, plicâ anticè emarginatâ robustè bilobato, lobo superiori ascendente, inferiori subhorizontali; labro acuto.* Long. 4 mill.; larg. 3 mill.

Hab. Island of Opara.

Found by Mr. Cuming under stones.

M. Petit also describes a new shell belonging to the genus *Scarabus*:—

Scarabus Cumingianus. *Scar. testâ ovato-acutâ, utroque latere compressiusculâ, sordidè fuscescente, longitudinaliter rugoso-striatâ, umbilicatâ; anfractibus novenis, planis; spirâ conicâ, lateraliter interdum castaneo-maculatâ; aperturâ longitudinali, margaritaceâ, nitente; columellâ tridentatâ, dente superiori longitudinali, anticè truncato, dente mediano crasso, basi obsoletè trilobato, inferiori transverso, lamelliformi; labro crasso, supernè intùs valdè sinuato, quinis dentibus instructo; umbilico intùs clauso.* Long. 29 mill.; larg. 20 mill.

Found by Mr. Cuming at Boljoon (island of Zebu), and at Tanhay, island of Negros.

Mr. Fraser laid before the Meeting some new species of Birds from Fernando Po, which he characterized as follows:—

Sylvicola superciliaris. *Sylv.* ♂ *corpore superiore, et lateribus nitidè olivaceis; mento, gulâ, et abdomine medio sordidè albis; lineâ a naribus super oculos, lineâ suboculari, plumis auricularibus, humerorum margine, femoribus, crissoque splendidè flavis; spatio inter oculos rictumque fusco; rostro nigro, pedibus carneis.*

Long. tot. 4 poll.; rostri, $\frac{5}{8}$; alæ, 2; caudæ, $1\frac{1}{2}$; tarsi, $\frac{3}{4}$.

Hab. Clarence, Fernando Po.

The whole of the upper surface and sides of the body, in this bird, are of a bright olive colour; the chin, throat and centre of abdomen are dirty white; a yellow line runs from the nostril over the eye, and

there is a mark under the eye of the same colour; the ears, edge of shoulders, thighs and under tail-coverts are also bright yellow; the space between the eye and the gape is brown; the bill is black and the legs are flesh-colour.

Bucco subsulphureus. *Buc. ♂ corpore superiore nigro, strigâ superciliari, necnon lineâ frontali sub oculos, et per genas tendente, sulphureis; spatio strigis incluso nigro; corpore inferiore, alarum caudâque tectricibus, secundariis, sic et caudâ flavo-marginatis; alarum tectricibus inferioribus flavido-albis; iridibus corylaceis; rostro nigro, pedibus saturatè plumbeis.*

Long. tot. $3\frac{3}{4}$ poll.; rostri, $\frac{3}{4}$; alæ, 2; caudæ, $1\frac{1}{4}$; tarsi, $\frac{1}{2}$.

Hab. Clarence, Fernando Po.

The upper surface of the head and body is black; superciliary stripe and one across the forehead, which passes under the eye and along the cheek, and the whole of the under surface, sulphureous; space between the superciliary and cheek stripes black; upper wing and tail-coverts, secondaries and tail, margined with yellow; under wing-coverts yellowish white; irides hazel; bill black; legs deep lead-colour.

This bird is like a *Nuthatch* in its habits, being capable of not only running up the trunk of a tree with great agility, but of descending also, head downwards, with equal or even more facility, an act which the *Woodpecker* is, I believe, unable to perform. The tail is short and very soft, and is not used in climbing. Like our European *Sitta*, the downward position seems the most easy and natural. Of the difference of sexes, if any, I am unable to speak, but I have reason to believe the young of this genus differ considerably from the adult*. The Buccos are stupid and inactive; I have shot three or four from the same tree, one after the other, without disturbing the rest.

Muscipeta (Tchitrea, Less.) tricolor. *Musc. ♀ cristâ, et mento nitidè nigris; corpore superiore cinereo; inferiore rufo, rostro pedibusque pallidè cæruleis; caudâ ——?*

Long. tot. —? poll.; rostri, $1\frac{3}{8}$; alæ, $3\frac{1}{4}$; caudæ, —?; tarsi, $\frac{5}{8}$.

Hab. Clarence, Fernando Po (June); in deep moult.

Halcyon leucogaster. *Halc. ♂ vertice nigro, et cæruleo alternatìm fasciato, notâ grandi rufo ab utrâque nari oriente et mandi-*

* I have in my collection young specimens of a species of *Bucco*, nearly allied to the above, and in which the body is much spotted and barred, as we so frequently find it in young birds, and wants the decided colouring characteristic of the adults of the present genus. These young birds I feel no doubt constitute a new species, but with such imperfect materials I do not think it desirable to impose a name. The plumage is very soft and loose; the upper parts of the body are of a blackish colour; the crown of the head is adorned with numerous small yellow spots, and the feathers of the back and rump are margined with yellow, giving a barred appearance to these parts; the wing-coverts are narrowly edged with dirty yellow; the under parts of the body are pale inclining to white, but as it were irregularly washed with yellow; the beak is horn-coloured, and the feet are black. These young birds were shot on naked isolated trees.

bulæ inferioris basim circumdante, necnon aures, et capitis latera, exindè super oculos tendente, et per latera colli corporisque sic et alarum tectrices ductâ; dorso splendidè cæruleo, quo colore tectrices alarum marginatæ, alæ, caudaque lavatæ sunt, gulâ, pectore et abdomine in medio albis; rostro pedibusque rubris.

Long. tot. $5\frac{1}{2}$ poll.; rostri, $1\frac{1}{2}$; alæ, $2\frac{1}{4}$; caudæ, $1\frac{1}{4}$; tarsi, $\frac{4}{12}$.

Hab. Clarence, Fernando Po.

Crown of the head alternately banded with blue and black; from each nostril commences a large patch of rufous, which envelopes the base of the lower mandible, ears, and sides of the head, forms a broad stripe over the eye, and extends along the sides of the neck and body, and also over the under wing-coverts; the back is ultramarine blue; the upper wing-coverts are tipped, and the wings and tail glossed with the same hue; the throat and the centre of the chest and abdomen are white; bill and feet red.

This beautiful species is very closely allied to the *Halcyon cyanotis*, Sw., but may at once be distinguished by the centre of the abdomen being white, which circumstance suggested the name. It is a shy bird.

Mr. Lovell Reeve then communicated a paper by Sylvanus Hanley, Esq., in which the author describes, subjoined, five new species of shells belonging to the genus *Donax*, a group of Acephalous Mollusks.

Donax semisulcata. *Don. testâ abbreviato-cuneiformi, totâ albido-lutescente, nitidâ, posticè attenuatâ, lævigatâ, margine dorsali valdè declivi; anticè brevissimâ, truncatâ, transversim sulcatâ et longitudinaliter striatâ; margine anteriore subrecto; vulvâ decussatâ, lateribus subangulatâ; intùs margine crenulato.*

Long. $\frac{2}{3}$ poll.; lat. $\frac{1}{2}$ poll.

Hab. —— ? Mus. Stainforth, Metcalfe, Hanley, &c.

A very distinctly characterized shell, which bears little resemblance to any other species of this genus, with the exception of the *straminea* of Schrœtter. That rare and almost forgotten shell differs from ours in the following particulars. The shape is altogether more rounded, the ventral edge less arcuated, the edges of the anterior slope rounded, and its transverse striæ obsolete. Moreover the posterior margin is entire.

Donax punctato-striata. *Don. testâ subtriangulari, valdè convexâ, pallidè livido-fuscâ, radiatim punctato-striatâ, margine dorsali utrinque valdè declivi, ventrali medio arcuato; vulvâ longitudinaliter argutè striatâ, lateribus obtusis; intùs purpureâ, marginibus dentatis; dentibus lateralibus in utrâque valvulâ duabus.*

Long. $\frac{4}{5}$ poll.; lat. $1\frac{1}{5}$ poll.

Hab. —— ? Mus. Stainforth, Metcalfe, Hanley, &c.

Combining the outline of the *striata* of Linnæus (not Chemnitz) with the dotted striæ of *denticulata*, this shell may nevertheless be easily distinguished from either by the obtuse edge of its anterior slope. The inner margin is strongly dentated, excepting at the anterior slope, where it is finely crenulated. I believe that it is found

on the shores of China, but will not venture to assign it *that* or any other locality.

DONAX CARINATA. *Don. testâ elongato-cuneiformi, anticè acuminatâ, convexâ, purpureo-fuscâ, striis longitudinalibus magis minusve distinctis ornatâ (sæpè politâ, radiisque saturatioribus obsoletè depictâ); vulvâ obliquè truncatâ, lateribus carinatâ, ferè planulatâ, striisque subgranulatis radiatâ; intùs purpureâ, dentibus lateralibus in utrâque valvulâ duobus, marginibus crenatis.*

Long. $\frac{4}{5}$ poll.; lat. $1\frac{2}{5}$ poll.

Hab. —— ? Mus. Stainforth, Metcalfe.

A species peculiarly characterized by the very sharp and subrostrated angle formed by the ventral edge with the nearly straight edge of the depressed and sharply carinated anterior slope. In the majority of specimens the striæ have become obsolete and the shell brilliantly polished. The general outline bears some little resemblance to that of the true *trunculus* of Linnæus, a very different shell from that erroneously but universally so designated by those who have written on British conchology.

DONAX DENTIFERA. *Don. testâ abbreviato-subtriangulari, posticè rotundatâ, anticè obtusâ et tumidâ, rugis tenuissimis strias longitudinales anticè decussantibus; vulvâ subbiangulatâ, striis tenuibus subgranulatis radiatâ, sulcoque dentifero notatâ; margine ventrali vix arcuato; dentibus cardinalibus et lateralibus in utrâque valvulâ duobus; intùs marginibus crenatis.*

Long. $1\frac{1}{5}$ poll.; lat. $1\frac{3}{8}$ poll.

Hab. —— ?

The abbreviated shape of this remarkable shell would alone separate it from most of the *Donaces* possessing a crenulated margin. The extraordinary tooth at the extremity of the radiating groove in one valve, which fits into a corresponding notch at the extremity of that of the other, is however its more prominent characteristic. A few teeth show themselves likewise at the extremity of the longitudinal elevated striæ which margin the anterior slope.

The colouring is extremely variable, being uniform flesh-colour, olive-yellow, with the umbones violet, or even white. The interior rivals the exterior in the diversity of its tints.

DONAX PULCHELLA. *Don. testâ transversim elongatâ, convexâ, pellucidâ, politâ, posticè attenuatâ, productâ, anticè brevi; obtusâ, margine ligamentali valdè convexâ; albidâ, striis longitudinalibus obsoletis anticèque radiis purpureis angustis tribus ornatâ; vulvâ lateribus rotundatâ, striisque tenuibus radiatâ; margine ventrali subrectâ, intùs crenulatâ; dentibus lateralibus valdè approximatis.*

Long. $\frac{1}{5}$ poll.; lat. $\frac{1}{2}$ poll.

Hab. West Indies.

An exceedingly common species from the West Indies, which, from its apparent similarity with the *scalpellum* of Gray, has hitherto remained uncharacterized. Its peculiarly transverse shape, its breadth being considerably more than twice its length, sufficiently distinguishes it from any of the *named* species of this genus, with the

exception of the *Owenii* and *scalpellum,* from which it is separated by its greater convexity and its distinctive colouring.

Mr. Hanley also describes a new species of Mya of Linnæus and Lamarck :—

Mya semistriata. *Mya testâ ovato-oblongâ, subæquilaterali, ventricosâ, posticè rotundatâ, anticè subtruncatâ et attenuatâ, candidâ, tenui, pellucidâ, longitudinaliter striatâ ; striis tenuibus, confertis, anticè elevatis ; areâ posticâ striarum experte, transversim rugosâ ; dente cardinali obliquo.*

Long. $\frac{3}{5}$ poll. ; lat. 1 poll.

Hab. —— ? Mus. Metcalfe.

A single valve, in the cabinet of W. Metcalfe, Esq., is the sole specimen of this elegant and distinct shell I have ever beheld, and forms a welcome addition to a genus possessing so few species as that of *Mya.* Its distinct radiating striæ occupying all but the posterior surface (which is roughened by concentric sublamellar wrinkles), prevent the possibility of its being confounded with any other species, except the *cancellata* of Conrad. But the coarse transverse wrinkles which cover the entire surface of that shell are totally wanting in ours, whilst its radiating striæ are few, indistinct, and by no means its prominent characteristic.

The anterior attenuation is caused by the sloping upwards of the ventral edge. The tooth closely resembles that of *arenaria,* but is more oblique.

January 24.—William Yarrell, Esq., Vice-President, in the Chair.

Professor Owen exhibited various bones, being the remains of a gigantic Struthious Bird (*Dinornis Novæ-Zealandiæ,* Owen) which has become extinct in the North Island of New Zealand, and proceeded to read his notes relating to them.

" Since the communication to the Zoological Society, Jan. 10th, 1843, of the letter of the Rev. Mr. Cotton, relative to the remains of the gigantic bird of New Zealand which had been collected in the North Island by the Rev. Wm. Williams, one of the boxes of these remains, transmitted by that gentleman to Prof. Buckland, has been received, and the specimens have been kindly placed in my hands for description.

" An entire femur, somewhat larger than that of which the shaft is described and figured in the Society's Transactions, proves the specific identity of the present remains with the fragment, upon which I ventured to affirm, three years ago*, that a large Struthious Bird 'of a heavier and more sluggish species than the Ostrich' had recently become extinct, if it were not still living, in New Zealand.

" The femur has very nearly the same proportions of thickness to length as in the Ostrich, but the shaft is less compressed ; it consequently differs from that of the Apteryx in being shorter in proportion to its thickness ; but it resembles the femur of the Apteryx, and

* The memoir was communicated to the Zoological Society November 12th, 1839, vol. iii. p. 32. pl. 3.

differs from that of the Ostrich and Emeu in the important character of the absence of the air-hole at the back part of the neck, and the consequent substitution of marrow for air in the interior of the bone. It differs from the femur of the Ostrich, and agrees with that of the Apteryx, in the greater width of the anterior interspace of the condyles; but it differs from that of the Apteryx, not only in size and general proportions, but also in the form of the distal extremity, which has a deeper posterior intercondyloid depression, and a sharper and more produced posterior part of the outer condyle.

"The length of the above femur of the great bird of New Zealand is eleven inches; the circumference of the middle of the shaft five and a half inches: but the present collection includes the shaft of a femur of another individual, with a circumference of seven and a half inches.

"The most perfect tibia in the present collection measures two feet four and a half inches in length, and apparently corresponds in proportion with the fragment of the larger femur. Now allowing that femur fourteen inches of entire length, the tibia is then twice the length of the femur, while in the Apteryx the tibia is only one-third longer than the femur. The larger *Struthionidæ*, as the Ostrich and Emeu, more nearly resemble the great New Zealand Bird in the proportion of their tibia, but it is not quite twice the length of the femur in those species. The tibia of the great New Zealand Bird differs from that of the Apteryx and all the large *Struthionidæ* in the complete osseous canal for the passage of an extensor tendon in the anterior concavity above the distal condyles. This osseous canal is commonly found in the tibia of the *Grallæ, Gallinæ, Anseres*, and many smaller birds. The proportion of length to thickness of the tibia is nearly the same in the Ostrich and the great New Zealand Bird; the circumference of the tibia at its proximal end, in the latter, is fifteen inches; at its middle, five inches.

"The most instructive bone in the present collection is a tarso-metatarsal bone, with the distal extremity entire, showing that the gigantic bird was tridactyle, like the Emeu, Rhea, and Cassowary. The remains of the proximal end of the bone prove it to have been articulated with a tibia about an eighth part shorter than the one above described, or to a tibia about two feet in length; the length of the tarso-metatarsal bone is one foot, or half the length of the tibia, which is exactly the proportion which the tarso-metatarsal bone of the Apteryx bears to the tibia. In the Emeu the tarso-metatarsal bone is as large as the tibia; in the Ostrich it is a little shorter than the tibia. The difference in the proportions of the tarso-metatarsal bone of the gigantic bird of New Zealand and of the Emeu will be obvious from the following dimensions:—

	Dinornis.		*Dromaius.*	
Tarso-metatarsal bone.	in.	lin.	in.	lin.
Length	12	0	14	6
Circumference of middle	4	5	2	8
Breadth of distal end	3	10	2	10

"The comparative shortness and strength of the trifid metatarsal

of the gigantic New Zealand Bird form its most striking resemblance to the Apteryx, to which it thus approximates more closely than to any of the large existing *Struthionidæ.*

"The proportions of the leg-bones, their denser texture, especially that of the femur, which, as in the Apteryx, contains no air, sufficiently indicate the generic distinction of the great New Zealand Bird from the tridactyle Emeu, Rhea, or Cassowary. The questions then arise,—is it likewise generically distinct from the *Apteryx*? or is it a gigantic species of that genus? These questions are determined by the tarso-metatarsal bone. The Apteryx is distinguished from the other *Struthionidæ* not more by its elongated bill than by the presence of a fourth small toe on the inner and back part of the foot, articulated to a slightly elevated rough surface of the tarso-metatarsal about a fourth of the length of that bone from its trifid distal end. There is no trace of this articular surface on the tarso-metatarsal of the Gigantic Bird, which was consequently tridactyle, as in the Emeu, Rhea, and Cassowary. The Dodo was tetradactyle, like the Apteryx; the shorter proportions of the legs of the Dodo also distinguish it from the Gigantic Bird, whose career in the North Island of New Zealand was probably closed about the same period as that of the Dodo's existence in the Isle of Rodriguez.

"The fragments of the pelvis prove this to have been relatively broader, behind the acetabula, than in the Ostrich, Emeu, or Apteryx, its proportions being more like those of the Bustard.

"The results of the foregoing comparisons justify the reference of the Great Bird of New Zealand to a distinct genus in the Struthious order, for which I propose the name *Dinornis,* with the specific appellation *Novæ Zealandiæ.*

"The extraordinary size of the tibia above described—still more that of the tibia said to measure two feet ten inches in length, obtained by Mr. W. Williams, and mentioned in his letter to Dr. Buckland—prove the *Dinornis* of *New Zealand* to be the most gigantic of known birds. There is little probability that it will ever be found, whether living or extinct, in any other part of the world than the islands of New Zealand, or parts adjacent. At all events, the *Dinornis Novæ Zealandiæ* will always remain one of the most extraordinary of the zoological facts in the history of those islands; and it may not be saying too much to characterize it as one of the most remarkable acquisitions to Zoology in general which the present century has produced."

Mr. Ogilby then communicated his descriptions of two new species of Baboon:—

"When at Frankfort in the year 1837 I saw in the museum of that city two Baboons of the genus *Cynocephalus,* which my friend Dr. Rüppell had brought from Abyssinia. They were however confounded with the 'Babouin' of the French authors (*C. sphinx*), under which name they are noticed in the 'Neue Wirbelthiere'; and though I was too well acquainted with that species, from having frequently seen an individual then living in the Surrey Zoological Gardens, to

fall into the same error, I yet committed the similar mistake of confounding the Frankfort animals with *C. anubis*, of which there was no specimen at hand to compare them with. Since that time I have had frequent opportunities of observing the latter species, which is an inhabitant of the coast of Guinea, and not uncommon in our museums and menageries; but it is only within the last few days that the acquisition of a fine adult male specimen of Dr. Rüppell's animal by the Zoological Society has enabled me to compare them together, and to ascertain their specific distinction. Both species are now living in the Society's Gardens, and offer a rare and valuable opportunity for studying their characters.

"The Abyssinian species, which was reported to have been brought from Bombay, but which had no doubt been carried thither on board some vessel trading to the Red Sea, possesses a higher degree of interest than attaches to any other Cynocephal. With the exception of *C. hamadryas*, it is the only known species in that part of Africa, and must consequently have been the animal which we find so frequently figured among the hieroglyphics, and which was worshiped by the Egyptians under the name of *Thoth*. I have shown elsewhere (Nat. Hist. of Monkeys, &c., i. 431) that the Sacred Baboon of the Egyptians was not the *C. hamadryas*, as supposed by Ehrenberg; and though, from the mistake above alluded to, I was at that time inclined to identify it with *C. anubis*, there can now be no reasonable doubt that the animal which played so important a part in the mythology of that remarkable people, and of whose worship the city of Hermopolis was the principal seat, must have been the species at present under consideration. If this conjecture be well-founded, it follows also that the names *cynocephalus*, *sphinx*, &c., so often employed by Greek and Roman writers, must have referred to the same animal, at least originally; but as modern zoologists have applied all these names in a definite sense, I propose to distinguish the new species by the equally appropriate designation which it bore among the ancient Egyptians.

"*Cynocephalus Thoth*.—The individual from which this description was taken is an old male of large size, and, like the rest of his congeners, of a morose intractable disposition. The face is broad and of a dirty livid flesh-colour, lighter along the centre and ridge of the nose, and somewhat browner on the cheeks and muzzle; the cheek-bones are protuberant, the rostrum truncated, and the extremity of the nose reaching, but not surpassing, the plane of the upper lip and teeth. The hair of the fore-quarters is longer and thicker than on the rest of the body, though it does not form so dense or copious a mane as in *C. hamadryas*. The colour of the upper and outer parts of the body may be described as dark olive-green, and that of the lower and interior as light yellowish green; the breast, throat and under part of the chin are silvery grey; the lower parts of the whiskers are of the same colour, but they acquire a yellowish green shade as they approach and become intermixed with the hair of the head; the ears and palms of the hands are naked, and of a dark brown colour; the callosities very large and flesh-coloured, and the naked

parts of the hips on each side of the callosities of a deep purple or violet-brown; the scrotum is brown, and the sheath of the penis flesh-coloured. The tail is of medium length, without a terminal tuft, and carried in the arched manner common to the rest of the genus. The hind surfaces of the legs and thighs are furnished with long hair of a yellowish brown shade; the hands are of the same colour as the body, but the hind fingers are covered with longish grey hairs, and this character, together with the dark purple colour of the naked hips and brown scrotum, will always be sufficient to distinguish the present species from *C. anubis* and *C. sphinx*, in both of which the naked parts of the buttocks are of a brilliant blood-red, and the scrotum pale flesh-colour. In colour indeed *C. Thoth* approaches more nearly to *C. sphinx* than to *C. anubis*; it has the same light silvery grey colour on the whiskers and under part of the body, but the upper colours are more obscure; the bright yellowish green is replaced by sordid dunnish brown, and the proportions of the two animals are entirely different, the long slender limbs and body of the *sphinx* contrasting strongly with the massive thick-set form of the present species.

"There is likewise in the Society's Gardens a second undescribed species of Cynocephal, of which I remember to have formerly seen a specimen in Wombwell's collection, but unfortunately neglected to take a note of it at the time. The individual which I am now about to describe was brought from the Niger Expedition, and presented to the Society by Lieutenant Webb, R.N. It is a semiadult male, of medium size, covered on every part of the body, both above and below, with long shaggy hair of a deep russet-brown colour, each hair being annulated with rusty-brown and black rings; and I may remark, that this and *C. anubis* are the only species in which I have observed that the hair of the breast and belly are similarly annulated, and almost as thickly furnished as that on the back and sides; the whiskers are likewise bushy, of the same colour as the hair of the back, and similarly annulated; but it should be observed, that from the very dark shade of the colours the annuli are but little conspicuous anywhere. The face is more slender and tapering than in any other male Cynocephal that I have ever seen; the cheek-bones are but little prominent, but the nose sensibly surpasses the extremity of the muzzle. The face and space surrounding the eyes are black or dark brown, the upper eyelids alone flesh-coloured; the ears and palms of the hands, as are likewise the upper sides of the fingers, the scrotum, callosities, and naked parts of the buttocks, are of the same colour. The hair of the head, whiskers and fore-parts generally is erect and bushy, and completely conceals the ears. This species is allied to *C. anubis*, but differs from it in the colour of the hair, in the absence of the light flesh-coloured circle about the eyes, and in the dark brown instead of blood-red colour of the callosities and naked parts of the buttocks. I propose to distinguish it by the name of *C. choras*, a name which is applied to this or some other species of Baboon on the west coast of Africa, and which has a sufficiently classical form to escape the censure of barbarism, notwithstanding its origin."

Descriptions of four new species of *Conus*, a genus of Pectinibranchiate Mollusks, by Mr. Lovell Reeve, were then read.

1. Conus Stainforthii. *Con. testâ conico-turbinatâ, leviter flexuosâ, albidâ, rubro purpureoque tinctâ, ad basin rosaceâ; granosâ, granis minutis, rubido carneove-albis, in seriebus equidistantibus parallelis transversaliter dispositis; spirâ mediocriter convexâ, tuberculis aspersis regulariter coronatâ; apice mucronato, symmetricè acuto; aperturâ subinflatâ, labro solidiusculo, intùs extùsque albo.*

Conch. Icon. pl. 1. f. 1.

The richly variegated purple painting of this new and very beautiful shell (which I dedicate to its fortunate possessor), and the rows of light small granular pimples standing out in relief, render it eminently characteristic. There is another specimen in Mr. Cuming's collection.

Hab. Unknown.

2. Conus lignarius. *Con. testâ oblongo-turbinatâ, luteo-fuscâ, fusco indistinctè bifasciatâ, longitudinaliter subtilissimè striatâ, filis tenuissimis rubellis densissimè cingulatâ; basi striatâ; spirâ planiusculâ, apice elato, acùto.*

Conch. Icon. pl. 15.

This shell, which is of an uniform brown colour, profusely corded and lined, both transversely and longitudinally, was found by Mr. Cuming on mud-banks just below low-water mark at Port Sacloban, Island of Leyte, Philippines.

3. Conus magnificus. *Con. testâ cylindraceo-turbinatâ, obesâ, anfractibus supernè rotundatis, spirâ lævi, subacuminatâ, apice valdè obtuso; rosaceâ, lineis ovato-trigonis, lacco aut purpureo-rubris, usquequaque reticulatâ, maculis perpaucis grandissimis bifasciatim cinctâ.*

Conch. Icon. pl. 6. f. 32.

This beautiful shell, which always exhibits a warm rosaceous tint, was collected by Mr. Cuming at Matnog, Island of Luçon, Philippines.

4. Conus Neptunus. *Con. testâ elongato-conicâ, spirâ acuminatâ, striatâ, apice acuto; pallidè carneolâ, lineis maculisque rubidis ubique nebulosâ et venosâ; versus basin leviter sulcatâ, sulcis subdistantibus; columellâ et aperturæ fauce subrosaceâ.*

Conch. Icon. pl. 6. f. 30.

Hab. Jacna, Island of Bohol.

The delicate marking of this gem approaches so nearly to that of the *Conus gloria-maris*, that we honour it with as noble a title.

BOTANICAL SOCIETY OF LONDON.

Oct. 6, 1843.—John Reynolds, Esq., Treasurer, in the Chair.

Mr. Adam Gerard exhibited a collection of fruits and seeds from Sierra Leone, containing specimens of the fruits of the Butter and Tallow Tree (*Pentadesma butyraceæ*).

Read "Notes of a Botanical Excursion to Tilgate Forest in August last," by the Chairman.

Nov. 3.—Hewett Cottrell Watson, Esq., V.P., F.L.S., in the Chair.

The following papers were read: "On the Botany of Lichfield," by the Rev. Richard Garnett; "Notes on a species of *Cuscuta* found at Duxford, Cambridgeshire," by Mr. Frederick Bond.

The Chairman presented a series of specimens of the Common Birch, in order to show that the forms described by different authors under the names of *Betula alba, pendula, glutinosa* and *pubescens* are only varieties of one single species, the original *Betula alba* of Linnæus. Mr. Watson stated that he had repeatedly found on different branches of the same tree, the various forms of leaf and other characters which were given as the distinctions between these supposed species; and that the leaves of *Betula glutinosa* or *pubescens* were produced usually (if not always) on the seedling plants of *Betula alba* or *pendula.*

Mr. Edward Doubleday presented specimens of *Primula elatior* from the Bardfield Station. These specimens were remarkable for the wide variation in the relative length of the calyx and corolla, and also in the form of the leaves, some specimens resembling the primrose in their tapering leaves, while others had the abruptly contracted leaves similar to those of the cowslip. It was announced that the Herbarium of the Society might be inspected every Friday evening from seven to ten.

Specimens of *Barkhausia setosa,* DeC., were exhibited, one of which was presented by Mr. Cumming in 1841, collected by him at Audley End, Essex. The other was presented by Mr. G. S. Gibson, and was collected by him in a field near Sampford, Essex, in 1843.

BOTANICAL SOCIETY OF EDINBURGH.

This Society held its first meeting for the season on Thursday, November 9, Dr. Neill in the Chair.

Professor Graham read an account of a botanical excursion, undertaken with some of his pupils in August last, to North Wales, the principal feature of which was the extreme paucity of the Alpine vegetation as compared with that on the Grampian ranges; and the great interest of the products in the Welsh valleys, when contrasted with the vegetation of low levels among the Scottish mountains.

Dr. Graham also read a notice by Dr. Bell Salter, of some recent additions to the flora of the Isle of Wight, and of the many species or varieties of *Rubi* occurring in that island, one of which, considered by Dr. Salter to be *Rubus suberectus,* was particularly interesting from its size, almost reaching that of a small tree, and with leaves above six inches in length.

Mr. Brand read a communication from Dr. W. H. Campbell respecting the Eta palm wood of British Guiana, which is of extreme lightness, and is used in the colony, among other things, for sharpening razors, &c., probably owing to its containing much *silex.* Dr. Campbell also mentioned several other kinds of wood equally remarkable for their solidity and weight, for their great beauty, and for the high prices they fetch in this country for veneering and other ornamental cabinet work.

MISCELLANEOUS.

DISCOVERY OF CLATHRUS CANCELLATUS IN BRITAIN.

Such readers of the 'Annals' as take an interest in cryptogamic plants will doubtless be glad to learn that *Clathrus cancellatus*, a genus and species new amongst British Fungi, has been discovered this autumn in the Isle of Wight, both by Mr. R. Kippist, Librarian to the Linnæan Society, and myself, quite independently of and unknown to one another, and in very different localities; Mr. Kippist having met with it close to this town (Ryde), and my plant occurring at the back of the island. I do not know the date of Mr. Kippist's finding the species here, but feel pretty certain it must have been anterior to my meeting with it, which was about the beginning of October, in a damp rocky and grassy hollow, just within and at the bottom of the Pelham woods by St. Lawrence, where it grew in tolerable plenty over an area of perhaps some seventy or eighty square yards or more of sward. My attention was involuntarily drawn to it by the excessively repulsive odour of carrion that pervaded the air around the spot, and which induced me to look about for the *Phallus impudicus*, a species well known to emit a scent so analogous to that of a dead animal, as to attract and apparently deceive the flies, and induce them to deposit their ova on the slimy pileus. The specimens of *Clathrus cancellatus* I found were many of them as large as an ordinary-sized orange, and presented the appearance of a very coarse or open network, forming slightly collapsed hollow spheres of a bright flesh-red precisely like raw meat, the vessels of which are still filled with blood; the texture externally cellular and I think laminated, emitting an odour which, unlike that of *Phallus impudicus*, was equally offensive, whether near to or removed from the organ of smell. This curious fungus was shown to me last year as something remarkable by a gardener on the grounds of — Walkingshaw, Esq., at Old Park near Niton, but in so decomposed a state as scarcely to exhibit its characteristic form; nor was I aware of the interesting addition made by Mr. Kippist and myself to the cryptogamic flora of this country till, being in London last week, and incidentally mentioning the circumstance of finding it to Mr. J. de C. Sowerby of the Botanic Garden, Regent's Park, I was made acquainted by that gentleman, and afterwards by Sir Wm. Hooker, with the fact of *Clathrus cancellatus* being unrecorded as a native of Britain, and indeed supposed exclusively indigenous to the more southern parts of Europe. It is probably not uncommon, at least in this island, where, as we have just seen, it occurs in three distinct localities, two of which are several miles asunder.

Ryde, Nov. 11, 1843. Wm. Arnold Bromfield, M.D.

LITHIC ACID IN LUCANUS CERVUS.

While engaged, during the past summer, in dissecting a male *Lucanus Cervus*, I found upon opening the intestine, that the cæcum, colon and rectum contained a dense greenish matter, of a soapy consistence, covering their internal surface, and which escaped slowly into the water, in which the specimen was immersed for examination, in the form of a thick cloud. Upon placing some of it under

the microscope, it was seen to consist of a great number of flat diamond-shaped crystals of different sizes, in the midst of which were interspersed some very small amorphous granules, collected together here and there in clusters, and exhibiting in many parts of the field a distinct molecular movement. My friend Dr. J. W. Griffith, who analysed this compound, assured me that its crystalline portion was composed of *lithic acid*; the amorphous part he believed to be *lithate of ammonia,* but its quantity was so small that he could not be positive—the former statement he is certain is correct. Bearing in mind that this substance was found in a part of the alimentary canal *posterior* to the insertion of the hepatic vessels, and that it is extremely improbable that it should have been secreted from the mucous lining of the intestine itself, there can be little doubt that it was discharged into the latter from the above tubes, and thus the fact becomes one of interest from its throwing light upon the much-disputed function of these organs. I regret at the time having omitted to examine also the contents of the tubes, but I am confirmed in my present view of their *uriniferous* office by the observations of other naturalists, among whom V. Audouin, in the fifth volume of the 'Ann. des Sciences Nat.,' has described two calculi as obstructing the biliary canals of a female "*Cerf-volant,*" and which, being treated by the usual chemical methods, were proved to be composed of uric acid. This writer does not, however, allude to the presence of its characteristic crystals. I would here take the opportunity of observing, that the analysis of the different secretions throughout the Articulated animals, and the Invertebrata generally, offers a wide field of research to those engaged in the study of organic chemistry.

1 Arthur Street, Gray's-Inn-road. ALFRED TULK.

ALCHEMILLA CONJUNCTA AND A. FISSA.

At page 74 of the present volume of these 'Annals,' Mr. W. C. Trevelyan refers the *A. conjuncta* (Bab.) to *A. fissa* (Schumm.) on the authority of 'Fl. Danica,' pl. 2101. That plate is far from good, the silvery underside of the leaves being very imperfectly represented, but still it seems to be intended to represent *A. conjuncta*. So far so good. But if now we examine the synonyms quoted in 'Fl. Dan.' we shall find that they belong to a very different plant, which is so closely allied to *A. vulgaris* as to have been considered as a variety of that species by many botanists. Wimmer and Grabowski ('Fl. Siles.' i. 136) take particular care to distinguish it from *A. vulgaris*, and describe the leaves as "reniformia circumscriptione orbiculari 7—9-loba, fissura ad folium medium pertinente lobis in folio complanato se vix tegentibus basi integerrimis quum in *A. vulgari* lobi ad basin usque serrati sint, inciso-dentatis . . . . totis glabris margine tantum undique ciliatis." This is the work usually quoted as the authority for this plant; its authors quote Mertens and Koch, but not having that book at hand, I refer to Koch's 'Synopsis' (ed. 2. p. 257), where the description belongs to the same plant and not to *A. conjuncta*. Koch and the 'Fl. Dan.' refer to *A. minor* (Tausch), published in his 'Plantæ Selectæ;' and the specimen contained in

that collection, which is now before me, is so similar to *A. vulgaris* (although I believe a distinct species), that most botanists would, upon a cursory inspection, refer it to that plant. It has not the most distant resemblance to *A. conjuncta* or *A. alpina*. The figure of *A. fissa* in Sturm's 'Deutsch. Fl.' 56. 12. represents the plant of Tausch, to which also correspond specimens named *A. fissa* by Reichenbach ('Fl. exsic.' 876) and by Shuttleworth. It is perhaps unnecessary to go further to convince my friend Mr. Trevelyan and the readers of the 'Annals,' that *A. fissa* (Schumm.) is not *A. conjuncta* (Bab.), although plate 2101 of 'Fl. Dan.' is probably intended to represent it. Should however more proof be required, it can be at once produced.

I may take this opportunity of stating, that during the late summer I examined Gatesgarth Pass, Cumberland, for this plant with great care, but totally without success.—Charles C. Babington.

St. John's College, Cambridge, Oct. 28, 1843.

ASSUMPTION OF THE MALE PLUMAGE BY A FEMALE PARTRIDGE.

Powerstock Vicarage, Bridport, Dorset, Oct. 30, 1843.

Mr. Yarrell in his 'History of British Birds' mentions two instances of thirty-one eggs having been found in a partridge's nest, and observes, "there is little doubt in these cases that more than one bird had laid eggs in the same nest." It may not perhaps be deemed unworthy of record that a partridge this year laid thirty-six eggs in my aviary, out of which thirty young birds were hatched by two domestic hens. As the history of my birds is rather curious, I will venture to relate it.

Late in the autumn before last (1841) a young partridge, about three weeks old, was caught by a boy and turned into my aviary, in which I had then a young ring-dove that could not rise from the floor, as the feathers of one of its wings had been clipped. The young bird immediately sought the protection of the Cushat and nestled under her wing.

After moulting our bird appeared in the distinctive plumage of a male, with the rich chestnut-coloured horseshoe-shaped patch on the breast. Early in the following spring we were much pleased by hearing the call of our bird answered repeatedly from a field adjoining our garden. In a short time we observed a wild bird to visit the aviary every evening. We soon succeeded in capturing this stranger, as we discovered that it generally roosted among the ivy with which the building is partly covered. To our surprise our prisoner proved to be a male, and we were now at a loss to account for the perseverance with which it sought the society of our bird.

In the following moulting season (the autumn of 1842) our tame bird however lost its chestnut-coloured crescent and the triangular patch of naked red skin above the ear-coverts, and assumed the plumage of a female; the doubts which we now entertained as to the sex of our favourite were cleared up early in the spring when she began to scratch together materials for her rude nest, in which she continued to lay an egg daily for more than five weeks. She however showed no disposition to sit.

It seems that the circumstance of this female bird having been

for one season cut off from the society of the other sex was sufficient to cause a temporary assumption of a plumage resembling that of a male, and that as long as that disguise continued, although she was no longer debarred from sexual intercourse, the natural result did not follow at the first moult after the admission of the male. She appears in her proper colours and proves extraordinarily prolific, producing double the ordinary complement of eggs.

I conclude from the above fact, that the assumption by female birds of the plumage resembling that of the male does not (as is the opinion of many physiologists) depend upon a derangement of the generative organs. GEORGE COOKSON.

SPIDERS DISCHARGED FROM THE EYE.

The 'American Journal of the Medical Sciences' for July 1843, p. 302, contains the following extraordinary relation, by A. Lopez, M.D., Mobile, Ala.

I was requested, Feb. 5, 1840, to visit a young lady, from whose mother I received the following statement:—The patient had left the city of Charleston to visit a friend in the country. On the night of the 29th of January, while conversing in bed, she was sensible that some object had fallen from the ceiling upon her cheek, just below the inferior lid. In the course of the night she was awakened by a feeling of intense pain in her left eye, which continued at intervals until morning, when the eye was discovered to be inflamed. Ordinary means were applied, and during the morning, feeling intense irritation, she rubbed the lids together upon the ball, and removed two fragments, which were readily recognised as the parts of a spider. Her alarm became very great, and was much heightened when the same thing was repeated in the afternoon. She returned to Charleston on the 2nd of February. When I paid my first visit on the 5th, the following was her condition: the right eye unaffected; the left turgid, inflamed and weeping; and there had been removed from it that morning a spider, imbedded in a mucous covering. It was entire, with the exception of two legs. The two preceding days before I had seen her, three others had been removed, and were now exhibited to me. I immediately submitted the eye to a close examination, without being enabled to discover the minutest portion of any foreign substance. I visited her daily until the 19th, and at every visit I removed either an entire or dismembered spider from the same eye. Between the 5th and 19th I invited, to an examination of the case, Professors Geddings and Dickson, and Doctors Bellinger and Wurdeman. Dr. Dickson, on one or two occasions, also removed these objects from the patient's eye. I made, assisted by Professor Geddings, the most minute scrutiny, with a view of discovering—first, whether there could possibly exist a nidus within the orbit for these animals; secondly, whether a sac containing their ova was there concealed; and thirdly, if any communication between the eye and the nose could account for their appearance. For these purposes the superior and inferior palpebræ were everted with great care, traversed thoroughly with a blunt probe, and afterwards I threw injections around the internal lining, but all to no avail. The anterior

and posterior nares were closely examined by strong light, both of the sun and candle, yet we could not perceive the slightest trace of any means by which either ova, insect or nidus could be retained.

The total number of spiders removed from the commencement was between forty and fifty. They were subjected to close microscopic examination by myself, assisted by several gentlemen accustomed to scientific investigations, among whom was the Rev. Dr. Bachman, whose reputation precludes all doubt, and we discovered at least three different species, distinguished by the anatomical classification of Latreille and Walckenaer.

[The entire account is copied in the 'Dublin Medical Journal,' from which we have given the above extract. Dr. Lopez refers to well-authenticated instances of pins and needles, worms and larvæ of insects discharged from various parts of the body. He comes, however, to the conclusion that in the case in question the spiders and fragments of spiders, were introduced from day to day by the patient herself, irresistibly impelled under the influence of a hallucination produced by hysteric monomania.]

METEOROLOGICAL OBSERVATIONS FOR OCTOBER 1843.

Chiswick.—October 1. Fine : clear : overcast. 2. Overcast : showery. 3, 4. Cloudy and mild. 5. Very fine. 6. Densely clouded : rain. 7. Cloudy : rain. 8. Boisterous : overcast. 9. Rain. 10. Clear : overcast : rain. 11. Boisterous : heavy rain. 12. Boisterous : rain. 13, 14. Clear : cloudy and fine. 15. Foggy : cloudy : frosty and foggy. 16. Frosty : clear and cold : frosty. 17. Stormy, with rain. 18. Cloudless : clear and frosty. 19. Frosty haze : clear : frosty. 20. Frosty haze : fine : cloudy. 21. Cloudy : showery : clear. 22. Cloudy and fine : stormy at night. 23. Clear : cloudy : clear. 24. Densely clouded. 25. Cloudy : clear. 26. Frosty : very fine : clear. 27. Very fine : boisterous, with rain at night. 28. Boisterous : clear and fine. 29. Hazy : clear : foggy. 30. Hazy : rain. 31. Heavy rain.—Mean temperature of the month $2\frac{1}{2}°$ below the average.

Boston.—Oct. 1, 2. Cloudy : rain early A.M. 3. Fine. 4, 5. Cloudy. 6. Cloudy : rain P.M. 7. Fine. 8. Cloudy : rain early A.M. 9. Rain : rain early A.M. : rain A.M. 10. Fine. 11. Rain. 12. Rain and stormy. 13. Fine. 14. Windy : ice this morning. 15, 16. Fine. 17. Cloudy : rain early A.M. : stormy night, with rain. 18—20. Fine. 21. Cloudy : rain early A.M. 22. Cloudy : rain P.M. 23. Fine. 24. Fine : rain P.M. 25—27. Fine. 28. Stormy : rain early A.M. 29. Fine. 30. Cloudy : rain early A.M. : rain P.M. 31. Cloudy.

Sandwick Manse, Orkney.—Oct. 1. Showers. 2. Showers : clear. 3. Showers : large hail. 4. Rain. 5. Drizzle. 6. Rain : showers. 7. Bright : showers. 8, 9. Cloudy : clear. 10. Showers. 11. Frost : showers. 12. Showers : hail. 13. Large hail. 14. Bright : showers. 15, 16. Hail-showers. 17. Snow-showers clear frost. 18. Clear frost : showers. 19—21. Showers. 22. Clear frost : showers. 23. Showers. 24. Showers : sleet : showers. 25. Showers. 26. Showers : aurora. 27. Cloudy : rain. 28. Drizzle. 29. Showers. 30. Showers : fine. 31. Showers : fine : clear.

Applegarth Manse, Dumfries-shire.—Oct. 1. Cloudy : rain P.M. 2. Fine. 3. Dull. 4. Cold : dull. 5. Fine : mild. 6. Wet, but mild. 7. Rain. 8. Showers. 9. Clear : fair. 10. Dull : fair. 11. Wet. 12. Cold : snow on the hills. 13. Cold : hail-shower. 14, 15. Fine and clear. 16. Fine : dry. 17. Rain and sleet. 18. Fine : frosty. 19. Clear : fair. 20. Dull : wet P.M. 21. Clear and sunny. 22. Very wet : cleared P.M. 23. Boisterous : showers. 24. Wet. 25, 26. Fine : frost A.M. 27. Fine. 28. Fair : chill. 29. Heavy rain. 30. Fair : frost. 31. Wet : frost A.M.

Mean temperature of the month	43°·8
Mean temperature of October 1842	44 ·4
Mean temperature of spring-water	45 ·5
Mean temperature of ditto Oct. 1842	49 ·6

Meteorological Observations made at the Apartments of the Royal Society, LONDON, *by the Assistant Secretary*, Mr. Roberton; *by* Mr. Thompson *at the Garden of the Horticultural Society at* CHISWICK, *near London; by* Mr. Veall, *at* BOSTON; *by the* Rev. W. Dunbar, *at Applegarth Manse*, DUMFRIES-SHIRE; *and by the* Rev. C. Clouston, *at Sandwick Manse*, ORKNEY.

Days of Month. 1843. Oct.	Barometer. London: Roy. Soc. 9 a.m.	Barometer. Chiswick. Max.	Barometer. Chiswick. Min.	Barometer. Boston. 8¾ a.m.	Barometer. Dumfries-shire. 9 a.m.	Barometer. Dumfries-shire. 9 p.m.	Barometer. Orkney, Sandwick. 9¼ a.m.	Barometer. Orkney, Sandwick. 8½ p.m.	Thermometer. London: R.S. Fahr. 9 a.m.	Thermometer. London: R.S. Self-reg. Mx.	Thermometer. London: R.S. Self-reg. Min.	Thermometer. Chiswick. Max.	Thermometer. Chiswick. Min.	Thermometer. Boston. 8¾ a.m.	Thermometer. Dumf.-shire. Max.	Thermometer. Dumf.-shire. Min.	Thermometer. Orkney, Sandwick. 9¼ a.m.	Thermometer. Orkney, Sandwick. 8½ p.m.	Wind. London: R.S. 9 a.m.	Wind. Chiswick. 1 p.m.	Wind. Boston.	Wind. Dumfries-shire.	Wind. Orkney, Sandwick.	Rain. London: R.S. 9 a.m.	Rain. Chiswick.	Rain. Boston.	Rain. Dumfries-shire.	Rain. Orkney, Sandwick.	Dew-point. Lond. R.S. 9 a.m.
1.	30·048	29·999	29·926	29·35	29·79	29·75	29·40	29·50	65·0	67·0	56·0	72	55	63	64	56	54	53	wnw.	w.	w.	sw.	w.	......	·11	·04	......	·18	57
2.	30·066	30·099	29·999	29·30	29·82	29·95	29·59	29·81	62·3	70·0	58·3	67	47	58	...	51	50	47½	sw.	nw.	w.	sw.	wsw.	......	·01	·05	......	·18	58
3.	30·214	30·138	30·061	29·50	......	29·93	29·75	29·89	58·3	64·8	53·4	65	54	55·5	63	49½	50½	46	w.	sw.	calm	sw.	w.	·119	·01	......	......	·14	55
4.	30·194	30·117	30·091	29·46	29·93	29·93	29·83	29·70	61·3	65·2	56·8	70	50	61	61	49	48½	52	w.	w.	w.	sw.	s.	......	......	......	......	......	57
5.	30·142	30·075	29·895	29·46	29·80	29·75	29·85	29·70	58·7	67·4	58·4	73	48	56·5	62	54	44	45	w.	e.	calm	sw.	e.	......	......	......	......	·60	57
6.	29·792	29·736	29·187	29·14	29·40	29·20	29·22	29·10	61·2	66·4	57·3	65	54	60	55	50	54½	52	s.	sw.	sw.	sw.	s.	......	·19	......	......	·47	58
7.	29·636	29·592	29·440	28·94	29·25	29·16	29·02	29·10	60·5	65·0	57·2	69	57	59	59	52	54	51	sw.	sw.	w.	sw.	w.	·158	·06	·04	......	·11	58
○ 8.	29·434	29·683	29·378	28·73	29·19	29·40	29·20	29·43	62·3	65·8	60·2	62	50	58	54	48	48½	43	sw var	w.	w.	w.	ne.	·016	·22	·18	......	......	59
9.	29·354	29·715	29·282	28·93	29·35	29·65	29·53	29·74	47·8	64·2	49·3	54	35	49	52	38	45	39½	n.	w.	calm	w.	ne.	·263	·11	·17	......	·03	54
10.	29·958	29·916	29·601	29·36	29·52	29·50	29·75	29·62	47·6	54·2	43·0	64	46	46·5	50	40	40	35½	s.	sw.	calm	w.	ne.	·030	·40	·18	......	·13	48
11.	29·238	29·217	29·098	28·76	29·12	28·90	29·44	29·40	59·2	60·5	48·2	60	42	49	47	40	39	40	sw var	sw.	calm	e.	ne.	·352	·14	·24	2·20	·21	53
12.	29·152	29·537	29·090	28·52	29·20	29·48	29·25	29·32	47·5	62·2	45·0	50	32	42·5	47	38	41	36½	w.	nw.	w.	nw.	n.	·161	·09	·11	......	·17	48
13.	29·706	29·753	29·598	29·18	29·45	29·45	29·20	29·54	40·3	50·3	39·2	53	32	39	46	30	37½	39	wnw.	w.	w.	nw.	n.	·080	......	......	......	·39	39
14.	29·780	29·771	29·740	29·30	29·68	29·71	29·69	29·72	42·0	50·2	40·0	54	29	39	50	30	42	37½	wnw.	nw.	w.	nw.	n.	......	......	......	......	·11	40
15.	29·720	29·697	29·649	29·32	29·62	29·65	29·70	29·68	38·7	49·8	38·0	52	25	37·5	46	26	37	36½	wnw.	s.	calm	w.	n.	......	......	......	......	·12	40
☾ 16.	29·692	29·682	29·621	29·31	29·58	29·28	29·51	29·52	38·8	46·0	36·3	49	27	36·5	47	22½	38	33	n.	nw.	calm	nw.	n.	......	·52	......	......	·15	37
17.	29·270	29·377	29·250	28·91	29·38	29·70	29·62	29·74	43·3	45·0	38·6	48	36	40	45	31	37	31½	s.	nw.	sw.	e.	n.	·327	·06	·51	......	·15	40
18.	29·892	30·157	29·855	29·45	29·85	30·10	29·99	30·11	40·6	46·7	38·3	50	24	38	44	28	37	38	w.	nw.	nw.	nw.	n.	·058	......	·44	......	·08	35
19.	30·350	30·343	30·312	29·93	30·24	30·23	30·15	30·00	36·7	47·0	31·6	52	22	35	46	25	44	45	wnw.	w.	calm	sw.	wsw.	......	......	......	......	·08	33
20.	30·338	30·321	30·104	29·84	30·02	29·72	29·89	29·62	37·2	49·6	33·0	57	37	37	51	31	47	47	nnw.	sw.	calm	s.	s.	......	·25	......	......	·28	33
21.	29·894	30·045	29·869	29·36	29·69	29·83	29·57	29·65	49·3	52·4	37·6	56	31	48·5	59	45	48	47	s.	w.	calm	nw.	w.	·213	·01	·24	......	·13	42
22.	30·116	30·086	29·897	29·58	29·65	29·56	29·44	29·38	46·3	54·8	40·7	60	44	45	54	40	50½	49½	s.	sw.	calm	sw.	s.	......	·11	......	0·94	·14	39
● 23.	30·084	30·048	30·012	29·44	29·77	29·63	29·50	29·24	51·0	56·2	46·6	61	47	53	55	45	47	45	w.	sw.	nw.	wnw.	sw.	·075	......	·11	......	·18	46
24.	29·892	29·868	29·544	29·28	29·48	29·35	29·00	29·04	54·4	56·5	49·7	59	45	53·5	45	44	45	41	sw.	sw.	calm	wnw.	w.	......	·34	......	......	·42	47
25.	29·432	29·404	29·391	28·95	29·28	29·29	29·08	29·22	45·7	57·4	46·3	52	28	44	48	30	42½	41	n.	ne.	calm	w.	w.	·352	......	·33	......	·29	47
26.	29·522	29·614	29·479	29·07	29·39	29·50	29·38	29·46	39·3	51·3	38·5	54	26	38	47	29½	42	40½	n.	w.	calm	w.	nw.	......	......	......	......	·53	41
27.	29·734	29·801	29·298	29·25	29·48	29·22	29·42	29·33	39·3	49·8	35·7	55	41	37	45	24½	40	40½	s.	s.	calm	w.	...	......	·17	......	......	......	41
28.	29·128	29·389	29·093	28·49	28·61	28·75	29·30	28·90	45·3	50·2	40·6	53	27	46	49	37	42	46	s.	sw.	w.	e.	e.	·122	......	·17	......	·35	43
29.	29·620	29·602	29·524	29·17	29·18	29·43	28·85	29·20	42·7	49·8	39·8	54	31	41	44	39	45	44	s.	s.	w.	w.	nw.	......	·26	......	......	·44	40
☽ 30.	29·422	29·877	29·305	28·95	29·42	29·20	29·43	29·31	51·8	52·3	43·2	62	46	47·5	43	27½	43	43	se.	s.	e.	sw.	nw.	·161	·25	·21	0·92	·25	44
31.	29·412	29·902	29·394	28·98	29·38	29·49	29·25	29·52	50·0	59·3	50·2	45	42	42·5	46½	30	42	36	n.	sw.	w.	sw.	w.	·322	·88	·33	......	·07	49
Mean.	29·749	29·825	29·612	29·20	29·517	29·538	29·474	29·499	49·2	56·4	45·5	57·96	39·03	46·9	50·8	38·0	44·37	42·64						Sum. 2·809	4·19	3·35	4·16	6·38	Mean. 46

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

SUPPLEMENT TO VOL. XII. DECEMBER 1843.

LIV.—*On the British species of* Meridion *and* Gomphonema. By JOHN RALFS, Esq., M.R.C.S., Penzance*.

[With a Plate.]

MERIDION, *Ag.* (*Eh.*)

Frustules cuneate, united so as to form segments of circles or spirals.

This genus, together with *Styllaria, Gomphonema* and *Licmophora,* form a group (the *Styllarieæ* of Agardh) distinguished by the triangular form of the frustules, which have their smaller ends directed towards a common centre. The frustules in this group have a central and two lateral portions as in *Diatoma* and *Fragilaria,* in which genera cuneate frustules are also occasionally met with. Indeed *Diatoma cuneatum,* Eh., is said to have all its frustules cuneate; in this case, therefore, the resemblance between solitary frustules will be considerable. But in *Fragilaria* or *Diatoma,* when two or more cuneate frustules are united, the alternate frustules have their smaller ends in opposite directions, and hence their filaments are linear; whilst they are attached, if at all, only by their basal frustule. In this group, on the contrary, as the smaller ends are in the same direction they point to a common centre, and when the plant is stipitate each frustule is attached to the stipes.

The frustules have generally two puncta at the broader end, and sometimes two others, but more obscure at the smaller end. The lateral surfaces are attenuated at the base, which usually differs somewhat from the upper end; but in the group to which *Fragilaria* belongs they are similar at both ends, even when the frustules are cuneate.

In a young state species of *Meridion* resemble *Styllaria,* but as the frustules increase in number and do not separate, they form more or less complete segments of circles; whilst in *Styllaria* rarely more than two, and never more than three, frustules are united together.

1. *M. circulare,* Ag. Frustules united into plane segments of circles; lateral surfaces clavate with distant, strongly marked striæ, the

* Read before the Botanical Society of Edinburgh.

ends of which appear as puncta along the margins of the front view. Ag. Consp. Diatom. p. 40 ; Kutz. Synop. Diatom. in Linnæa 1833, p. 558. f. 37 ; Harv. Br. Alg. p. 205. *Meridion vernale*, Eh. Die Infus. p. 207. t. 16. f. 2 ; Pritch. Infus. p. 223. f. 177–179 ; Bailey, Amer. Bacil. in Amer. Jour. Sci. Jan. 1842, pl. 2. f. 42. *Echinella circularis*, Grev. Crypt. Fl. t. 35.

Limerick, *Mr. Harvey*. Aberdeen, *Dr. Dickie* ; Stevenston, Ayrshire, *Rev. D. Landsborough*. Tunbridge Wells, *Mr. Borrer* ; Lewes, *Mr. Jenner* ; King's Cliffe, *Rev. M. J. Berkeley* ; Oswestry, *Rev. T. Salwey* ; Cheshunt, *Mr. Hassall* ; Penzance, St. Ives, Tavistock, Dolgelley, Caernarvon.

This forms a fringe on aquatic plants or a mucous stratum on wet rocks. It is hyaline with a brown tinge and becomes green in drying. In a young state, when the frustules are solitary or binate and attached to a loose mucous base, it is liable to be mistaken for a species of *Styllaria*; afterwards however, as its frustules repeatedly divide longitudinally without separating, they are arranged in segments of circles. I have never seen more than half a circle formed in this way, which consisted of from twenty-two to twenty-six frustules. Kutzing figures a complete circle without a break, but he is evidently wrong ; for if the regular line of frustules was extended until the ends met they would not unite, but overlap or form a spiral, as figured by Ehrenberg*.

The frustules vary much in length ; they have in front two conspicuous puncta at the upper end and from five to twelve along each lateral margin, which produces a beaded appearance. These puncta are largest towards the upper end, and gradually become less evident as they are placed lower down, and generally are not visible near the lower end. The endochrome in drying generally retires to the margins, leaving the centre colourless ; it is at first homogeneous, but finally becomes granular. Lateral surfaces narrow, clavate, with a few distant, strongly marked, transverse striæ, which are most evident near the upper end and wanting near the base.

PLATE XVIII. fig. 1. *Meridion circulare.*

2. *M. constrictum.* Lateral surfaces constricted below the apex, transversely striated ; the ends of the striæ forming puncta along the margins of the front view.

This is one of the additions to our flora, for which I am indebted to Mr. Jenner, whose discoveries have added so largely to the Sussex Cryptogamia, and who is as indefatigable in his researches as he is accurate in his observations. Mr. Jenner finds it rather plentifully in the Cold Bath Spring, Tunbridge Wells,

* Since the above was written I have gathered specimens at Dolgelley which formed a spiral as figured by Ehrenberg.

growing on *Fragilaria virescens*; I have received from him both dried and recent specimens; in the latter I find the frustules solitary or binate, the circles being entirely broken up before the specimens reached me; but Mr. Jenner informs me that when gathered they are united together so as nearly to form a circle. As however they are not arranged on a plane as in *Meridion circulare*, but stand nearly erect, somewhat like the staves of a tub, which is broader above than below, when they dry and fall down they necessarily separate, and gaps are produced in the circular outline. In the dried specimens I find some of the frustules arranged in a circle, which however exhibits the gaps already noticed, whilst others seem to be fasciculated.

The front view cannot be distinguished from a frustule of *Meridion circulare*, with which it agrees in size and form, and also in having two conspicuous terminal puncta and a series along the lateral margins. As in *Meridion circulare*, the lateral surfaces have a few distant, strongly marked, transverse striæ; but they differ from it most remarkably in the constriction below the apex.

Plate XVIII. fig. 2. *Meridion constrictum.*

Gomphonema, *Ag.* (*Eh.*)

Frustules cuneate, solitary or geminate, terminating a simple or branched filiform stipes.

The species with cymbiform frustules have very properly been separated by Ehrenberg from *Gomphonema*, and now form his genus *Cocconema*, the British species of which I intend to describe in a future paper.

The genus as thus restricted borders closely upon *Styllaria* and *Licmophora*, and as it were forms a connecting link between them. It is only in the young state that in a few instances its frustules are sessile and resemble those of *Styllaria*, the frustules of which however are always sessile; whilst in *Gomphonema*, although sometimes they are at first nearly or quite sessile, yet ultimately they have an evident stipes, and in most specimens some frustules may be observed thus elevated. Its connexion is still more intimate with *Licmophora*, which indeed Kutzing unites with this genus. Mr. Borrer suggests the propriety of making *Licmophora* a section of *Gomphonema*. Mr. Berkeley observes, that "in *Licmophora* the frustules again divide, which is the sole difference between the two genera, as I many years ago pointed out to Dr. Greville." I am by no means sure that Kutzing is wrong in uniting *Licmophora* with *Gomphonema*, but I have not ventured to unite them, as the habit of *Licmophora* is somewhat different.

In *Gomphonema* the stipes is branched in a dichotomous manner, and in all the species with which I am acquainted the frus-

tules are terminal. They are generally simple or binate; I have never seen more than six frustules from the same point, and even when more than two frustules are thus occasionally combined, they are usually in contact only at the base; on most of the branches also the frustules are only binate.

In *Licmophora* the stipes is irregularly branched, each branch being terminated by several frustules, often ten or more, united by their sides into a fan-like form. Besides these terminal clusters, the main trunks of the stipes have binate or ternate frustules, sessile or nearly so along their margins, and either opposite or alternate.

The species of *Gomphonema* are commonly found in fresh water. The frustules are cuneate, and at their upper margin have two notches which look like puncta; as these are in some species very evident and in others scarcely discernible, they assist in forming the specific characters.

There are two obscure puncta at the base, and generally a single slight notch near the middle of each lateral margin.

The lateral surfaces are generally transversely striated, and have a longitudinal pellucid line running down the centre.

* *Lateral view constricted beneath the apex so as to appear urn-shaped.*

1. *G. geminatum*, Ag. Densely tufted; frustules narrow, cuneate, the puncta at the end wanting or nearly so; lateral surfaces urn-shaped, striated. Ag. Syst. p. 12; Consp. Diatom. p. 35; Grev. Crypt. Fl. t. 244. f. 2; Kutz. Synop. Diatom. in Linnæa 1833, p. 569; Harv. Br. Alg. p. 207. *Gomph. ampullaceum*, Grev. in Hook. Br. Fl. p. 410.

On rocks in subalpine streams. Scotland, *Dr. Greville*. North of Ireland, *Mr. D. Moore*; near Bandon, county Cork, *Mr. Allman*; on dripping rocks near a waterfall at Carnlough, co. Antrim, *Mr. W. Thompson*. Rapid streams at base of Cader Idris, and in the river above Dolgelley, N. Wales.

This plant forms large cushion-like tufts on the rocks in rapid streams. It is not in the least mucous, but is of a spongy texture, being composed of the densely interwoven filaments: in a young state its colour is brownish from the frustules covering the surface, but as these fall off it becomes whitish, and indeed not unlike a tuft of wool. Filaments repeatedly dichotomous; frustules much larger than in any of the following species, simple or binate, linear-cuneate, without puncta at the upper end; portions of the lateral surfaces are frequently visible along the sides. Lateral surfaces urn-shaped, broader than the front, with numerous transverse dotted striæ. There is a central longitudinal pellucid line slightly dilated at each end, with a larger dilatation in the centre; the latter at first sight may be taken for a perforation,

which it undoubtedly is not; from this central punctum the striæ are somewhat radiant: the pellucid line does not quite extend to the upper end.

I have drawn up the description of this plant from a specimen of Dr. Greville's given to me by Mr. Harvey, to whom I feel much indebted for his kind communications, as well as for the liberality with which he has added numerous most valuable specimens of Algæ to my collection.

I regret that I have been unable to obtain an authentic specimen of Dr. Greville's *Gomphonema ampullaceum*, but from the description I have little hesitation in uniting it with this species. Mr. Moore, who considers it distinct from *Gomphonema geminatum*, has sent me specimens under both names, but I cannot discover any essential difference between them. Mr. Moore makes the following observations on *Gomph. ampullaceum*:—"This, besides growing in much larger tufts than *G. geminatum*, is of a much greener colour when recent, resembling some *Vaucheriæ* going into decay. The frustules are much constricted below the apex, and have generally a more pellucid line running down the centre."

Plate XVIII. fig. 3. *Gomphonema geminatum.*

2. *G. pohliæforme*, Kutz. Very minute; frustules cuneate, with two evident puncta at the upper end; lateral surfaces urn-shaped, striated. Kutz. Synop. Diatom. p. 570. f. 50. *Gomph. truncatum*, Eh. Die Infus. p. 216. t. 18. f. 1; Pritch. Infus. p. 227. f. 187–190. *Gomph. pohliæforme*, Kutz. Alg. aq. dulc. No. 25! (*young.*) *Gomph. subramosum*, Kutz. Synop. Diatom. p. 570. fig. 44. Alg. aq. dulc. No. 152! (mixed with *Gomph. minutum*).

On aquatic plants in freshwater pools and ditches: autumn and spring. Near Henfield, *Mr. Borrer*; Tunbridge Wells, *Mr. Jenner*; Cheshunt, *Mr. A. H. Hassall*; Oswestry, *Rev. T. Salwey*; Ilfracombe, Swansea, Dolgelley and Bangor, N. Wales.

This is a very minute species, which to the naked eye seems only a brownish discoloration of the plant on which it grows. At first the frustules are frequently quite sessile, but ultimately they become elevated on a simple or slightly branched stipes, when they are sometimes clustered four or six together; they are cuneate with two evident puncta at the upper end. The lateral surfaces are constricted below the apex so as to be urn-shaped, and are attenuated at the base. When young the frustules are short and the lateral view is but little constricted, but when mature they are longer and the lateral view becomes more completely urn-shaped. In the former state it is figured by Kutzing and Ehrenberg; in the more perfect form it resembles Ehrenberg's figure of *Gomphonema capitatum*, nor is there any character in his description to distinguish the latter from this species.

Ehrenberg appears to have confounded this plant with *Gomphonema geminatum*, Ag., which species, as well as the *Gomph. pohliæforme* of Kutzing, he appends as synonyms to his *Gomph. truncatum**. If he had seen the true *Gomph. geminatum* he could not have fallen into this mistake, for besides the immense difference between these plants in size and habit, their frustules possess sufficient marks of distinction. In *Gomph. geminatum* the front view is very narrow, sometimes nearly linear; in this species they are distinctly cuneate, and notwithstanding their much smaller size, have two evident notches at the upper end, which are wanting in *Gomph. geminatum*. The lateral surfaces too are more attenuated at the base, and they are about as broad as the front, whereas in *Gomph. geminatum* they are much broader.

PLATE XVIII. fig. 4. *Gomphonema pohliæforme*.

3. *G. minutum*, Ag. Minute; frustules with a terminal crest; lateral surfaces striated, constricted below the apex; laterally viewed, the end of the crest appears like a terminal point. Ag. Consp. Diatom. p. 34; Grev. in Hook. Br. Fl. vol. ii. p. 410. *Gomph. acuminatum*, Eh. Die Infus. p. 217. t. 18. f. 4; Pritch. Infus. p. 228.

On aquatic plants in ponds and ditches. Sussex, *Mr. Jenner*; Herts, *Mr. Hassall*; Barmouth, *Rev. T. Salwey*; Trengwainton ponds near Penzance, and pond on Towednack Moor near St. Ives, Dolgelley.

This species, which forms a brownish mucous fringe on the

* It is greatly to be regretted that Ehrenberg has in so many instances disregarded the names previously affixed by Agardh and Kutzing. To alter a name once bestowed is not only discourteous to the first describer, but creates confusion and tends to encumber the science with synonyms; for if it be allowable for one writer to alter a name because he fancies that a new one is more appropriate, succeeding writers have an equal right to alter his names, and in the absence of a recognised rule, some naturalists may prefer one name and some another.

There is an excellent paper on Nomenclature in the 'Annals of Natural History,' vol. xi. p. 259, which is deserving of consideration, not only because it was written at the request of the British Association, but also from the celebrity of its authors. Although it is more particularly addressed to zoologists, yet great part of it may be equally useful to botanists, and some of the remarks are so appropriate to the present subject that I cannot forbear quoting them.

"The names originally given by the founder of a group, or the describer of a species, should be permanently retained to the exclusion of all subsequent synonyms.

"No one person can subsequently claim an authority equal to that possessed by the person who is the first to define a new genus or describe a new species, and hence it is that the name originally given, even though it may be inferior in point of elegance or expressiveness to those subsequently proposed, ought as a general principle to be permanently retained. To this consideration we ought to add the injustice of erasing the name originally selected by the person to whose labours we owe our first knowledge of the subject."

leaves of aquatic plants, is very minute, but still distinctly visible to the naked eye.

Stipes slender, branched; frustules cuneate, varying in length, the shorter ones most decidedly cuneate, the more elongated ones often nearly linear, slender; the terminal crest is much more developed in some frustules than in others, and but rarely nearly obsolete; the terminal puncta wanting or very minute; lateral surfaces transversely striated with a central longitudinal pellucid line. In a young state of this plant the frustules are short and the constriction below the apex is but slight; in its mature state this constriction is more evident, and the lateral surfaces are of a narrow urn-shaped figure, often much attenuated at the base: the end of the crest, appearing like a terminal point, adds greatly to the beauty of this form.

This species is easily distinguished from all except the following by the terminal crest; from *Gomph. cristatum* it differs in being constricted below the apex and in its slender frustules.

Plate XVIII. fig. 5. *Gomphonema minutum.*

** *Lateral surfaces not constricted beneath the apex.*

4. *G. cristatum.* Frustules crested; lateral surfaces striated, obovate; viewed laterally, the crest appears like a terminal point.

On *Conferva glomerata* in a stream near Shoreham, Kent, *Mr. Jenner*.

Of this new and very distinct species I have only seen a solitary specimen, found by Mr. Jenner in December last*. The lateral view is very unlike that of any other species with which I am acquainted.

It is very minute; the stipes slender, simple, or rarely once divided; frustules cuneate, somewhat rounded at the angles and terminated by a crest; the lateral surfaces are obovate, striated, and the end of the crest appears like an apiculus.

This species somewhat resembles *Gomph. minutum* on a front view, having, like that species, a terminal crest, but it is a smaller plant, the frustules are shorter and their angles rounded. The lateral view also is broader, and wants the constriction which occurs in *Gomph. minutum* below the apex.

Plate XVIII. fig. 6. *Gomphonema cristatum.*

5. *G. dichotomum,* Kutz., forms a minute fringe on the leaves of aquatic plants; frustules linear-cuneate, terminal puncta very minute; lateral surfaces lanceolate, faintly striated. Kutz. Synop. Diatom. p. 569. f. 48. *Gomph. gracile,* Eh. Die Infus. p. 217. t. 18. f. 3; Pritch. Infus. p. 227.

This species forms a minute brownish mucous fringe on the

* Mr. Jenner has since favoured me with specimens gathered by him near Farnham in Surrey, where the plant is more abundant than at Shoreham.

leaves of aquatic plants in Trengwainton ponds near Penzance, where it grows with *Gomph. minutum,* which to the naked eye much resembles it; but the present is a taller plant, although its frustules are considerably less.

The stipes is slender, much-branched; the frustules minute, narrow, often nearly linear, the terminal puncta very minute; lateral surfaces narrow-lanceolate, striated.

The frustules somewhat resemble those of *Gomph. Berkeleii,* but they are more elongated, much narrower, often nearly linear, and their puncta are far less distinct; the lateral view is also more slender, and lanceolate not clavate.

Plate XVIII. fig. 7. *Gomphonema dichotomum.*

6. *G. Berkeleii,* Grev., forms rather large mucous masses; stipes branched, entangled; frustules short, triangular, with two conspicuous puncta at the end; lateral surfaces obovate or subclavate, striated. Grev. in Hook. Br. Fl. vol. ii. p. 409; Harv. Br. Alg. p. 207. *Gomph.? olivacea,* Eh. Die Infus. p. 218. t. 18. f. 9; Pritch. Infus. p. 228. *Exilaria minutissima,* Berk. Br. Alg. p. 22. t. 7. f. 1. *Meridion vernale,* Ag. Consp. Diatom. p. 39. *Frustulia olivacea,* Kutz. Syn. Diatom. p. 556. f. 31. *Gomph. geminatum,* Kutz. Alg. aq. dulc. No. 13. *Gomph. Leibleini,* Kutz. Synop. Diatom. p. 568. fig. 46.

β. scattered, frustules more firmly attached to the stipes, which can be detected without difficulty.

On stones, &c. in fresh water: spring. King's Cliffe, Northamptonshire, *Rev. M. J. Berkeley*; Henfield, Sussex, *Mr. Borrer*; Mayfield, Sussex, *Mr. Jenner*; Yarmouth, *Mr. Dawson Turner* (according to a specimen from Mr. Borrer); river Severn near Shrewsbury, *Mr. Leighton*; Cheshunt, Herts, and river Lea, *Mr. A. H. Hassall.* At the base of Bandon mountains, *Mr. Andrews.*

β. Duddingston Loch, *Dr. Greville.*

This plant, which forms rather large mucous masses, is of a pale hyaline brown, but when dried generally becomes of a pale green with a granulated appearance. The stipes is hyaline and more or less branched; frustules minute, short, triangular, easily detached from the stipes; puncta at the end strongly marked; lateral surfaces striated, obovate in the shorter frustules, somewhat clavate in the longer ones.

In general the frustules are easily detached from their stipes, and as the latter are with difficulty distinguished from the gelatinous substance in which they are imbedded, they are very liable to be overlooked, whence the plant has often been referred to another genus.

In the spring of 1841, I applied to Mr. Borrer for information respecting *Meridion vernale,* which Agardh in his 'Conspectus Criticus Diatomacearum' mentions as a British plant upon the authority of a specimen received from Mr. Borrer, but which is

unnoticed in our British works. Mr. Borrer, with his accustomed kindness, sent me several specimens from Henfield, some of them recent and others gathered formerly, and also one gathered near Yarmouth by Mr. Dawson Turner. On examining the latter, which was less gelatinous than those from Henfield, I was surprised to find that the frustules were attached to a stipes. Although I could not detect this stipes in the dried specimens from Henfield, I discovered it in the recent ones, and also in some fine specimens sent me from Shrewsbury by Mr. Leighton. Shortly afterwards I received from Mr. Berkeley recent specimens of Greville's *Gomph. Berkeleii*, which proved to be the same plant. Mr. Berkeley writes, that, as far as he can judge without seeing an authentic specimen, he considers it to be the *Echinella olivacea* of Lyngbye, t. 70, as it certainly is of Jurgens, Dec. xvi. no. 9.

Mr. Berkeley has also afforded me an opportunity of examining Greville's *Gomph. minutissimum.* In his specimen I find two species mixed together; the more plentiful one has the frustules similar to those described above, and indeed differs from *Gomph. Berkeleii* only in its scattered habit, and in the frustules being attached more firmly to the stipes, which is more evident as the plant does not form mucous masses. On these grounds, and as I have since received from Mr. Hassall specimens of an intermediate character, I have been induced to consider it a variety of the present species. The other species in Dr. Greville's specimen has curved frustules, and as these are referred by Kutzing and Ehrenberg to *Gomph. minutissimum*, I have described it below under that name.

On a front view the frustules of *Gomph. Berkeleii* most resemble those of *Gomph. pohliæforme*, but the lateral aspect is very different. The variety β. especially approaches nearer to *Gomph. dichotomum*; the frustules however are shorter, broader and more decidedly cuneate; the lateral surfaces also are broader, being frequently as broad as the front.

Plate XVIII. fig. 8. *Gomphonema Berkeleii.*

7. *G. minutissimum*, Grev. Frustules cuneate, curved; terminal puncta conspicuous, a stria from each extending the entire length of the frustule; lateral surfaces clavate or lanceolate, striated. Kutz. Syn. Diatom. p. 567. f. 43; Eh. Die Infus. p. 219. t. 18. f. 5; Pritch. Infus. p. 228. *Gomph. curvatum*, Kutz. Syn. Diatom. p. 567. f. 51; Kutz. Alg. aq. dulc. No. 76!

β. *marinum*. Stipes more branched, the striæ running down the frustule more strongly marked.

In slow streams, Shrewsbury, *Mr. Leighton*; Shoreham, Kent, *Mr. Jenner*; Cheshunt, *Mr. Hassall*; near Dublin, *Mr. Allman.* Swansea.

β. On marine algæ, Eastbourne, Sussex, *Mr. Jenner*, and Ireland, *Mr. W. Thompson.* Ilfracombe.

Very minute, brown; frustules cuneate, curved, often nearly sessile; sometimes, especially in the maritime variety, on an elongated branched stipes, generally binate, though occasionally as many as four frustules are united together. Terminal puncta large; each of the puncta at the base, which are more evident than in the other species, is connected with the upper punctum on the same side by a line passing down the frustule. A slight notch or punctum is present at the centre of the concave but not of the convex margin; lateral surfaces very narrow, generally clavate, striated.

This species differs from all the foregoing in its curved frustules, in having a notch on one only of the lateral margins, and two striæ passing down the frustule and connecting the upper and lower puncta.

I have attempted in vain to find some specific character to distinguish the maritime form. It is more branched, has a very rigid appearance, looking indeed not unlike a zoophyte, and the striæ connecting the puncta on the front surface are strongly marked; but intermediate specimens are occasionally met with in which all these differences vanish.

Plate XVIII. fig. 9. *Gomphonema minutissimum.*

8. *G. paradoxum,* Ag. Frustules broadly cuneate, puncta at the upper end strongly marked, with a stria from each passing down the frustule; lateral surfaces clavate, narrow, not striated. Ag. Consp. Diatom. p. 34; Harv. Br. Alg. p. 208; Kutz. Syn. Diatom. p. 569. *Echinella paradoxa,* Grev. Crypt. Fl. t. 25; Eh. Die Infus. p. 221; Pritch. Infus. p. 208.

On marine algæ very common.

This species forms a brown gelatinous covering on the smaller algæ; it turns green in drying. At first the frustules are nearly sessile, but when mature they are attached to a more or less branched stipes forming a fringe on the infected plant, which is distinctly visible to the naked eye; the frustules are broadly cuneate, with two conspicuous puncta at the upper end, and two striæ extend the entire length of the frustule. There are no puncta on the lateral margins; the lateral surfaces are very narrow in comparison with the front, much more so in fact than in any of the preceding species; they are clavate in form and not striated.

I am not sufficiently acquainted with *Gomph. majusculum,* Harv., to make any remarks upon it.

Plate XVIII. fig. 10. *Gomphonema paradoxum.*

Analysis.

1. { Lateral surfaces of the frustules constricted beneath the apex so as to appear urn-shaped 2
   { Lateral surfaces not urn-shaped 4

2.	Frustules with a terminal crest	*minutum.*
	Frustules not crested	3
3.	Forms large masses; frustules large without terminal puncta	*geminatum.*
	Very minute; frustules minute with two conspicuous terminal puncta	*pohliæforme.*
4.	Frustules with a terminal crest	*cristatum.*
	Frustules not crested	5
5.	Frustules curved	*minutissimum.*
	Frustules not curved	6
6.	Marine; lateral surfaces not striated, front with striæ extending from the terminal puncta	*paradoxum.*
	Fresh water; lateral surfaces striated, front surfaces without longitudinal striæ	7
7.	Front view nearly linear; lateral surfaces lanceolate	*dichotomum.*
	Front view broadly cuneate; lateral surfaces obovate or clavate	*Berkeleii.*

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

Feb. 22, 1843.—A paper was read "On some new species of Fossil Chimæroid Fishes, with remarks on their general affinities," by Sir Philip Grey Egerton, M.P., F.G.S.

The number of described species of Chimæra—soft-boned fishes of singular forms—is very small, whether existing or extinct. They were first recognised in a fossil state by Dr. Buckland in 1835. The original memoir comprised descriptions of four species; two others were added by Professor Agassiz. The list was soon afterwards augmented by two species from the Stonesfield slate, constructed by Dr. Buckland from some enigmatical specimens forwarded by the author under the impression that they had some resemblance to the subjects he was engaged upon. A ninth species came from the Caen oolite. A tenth has been described by Professor Owen in his 'Odontography' from specimens in the Hunterian collection, and Professor Agassiz has named an eleventh in the museum of Lord Enniskillen, from the gault. Sir P. Egerton, in the present memoir, doubles the number. With one exception he founds his characters on the lower jaws of the animals, avoiding the risk of ascribing specific differences to teeth derived from one and the same species, varying in form according to their position in the mouth.

The characters of the new species are as follows:—

1. *C. neglecta.*—Maxillary plate, left lower jaw: length 6 lines; depth at the symphysis 2 lines; ditto at the medial angle of the dental edge 3 lines; length of the dental edge $3\frac{1}{4}$ lines; anterior division of ditto $1\frac{1}{2}$ line; posterior ditto ditto $1\frac{3}{4}$ line; length of the heel $2\frac{1}{2}$ lines; exterior convex; exposed surface slightly furrowed; base expanded and vertically striated; two depressions, the anterior one broad, the posterior narrow and deep. Stratum, great oolite: locality, Stonesfield.

2. *C. Bucklandi.*—Maxillary plate, right lower jaw (imperfect): length 2 inches 1 line; depth at the symphysis 1 inch 2 lines; ditto at the medial angle of the dental edge 9 lines; length of the dental edge 1 inch 6 lines; anterior division of ditto 1 inch; posterior ditto mutilated; exterior smooth and flat; inner surface rounded, diminishing in diameter towards the base; symphysis oblique and rounded; texture dense. Stratum, great oolite: locality, Stonesfield.

3. *C. psittacina.*—Maxillary plate, right lower jaw: length 8 lines; depth at the symphysis 4 lines; ditto at the medial angle of the dental edge 4 lines; length of dental edge 4 lines; anterior division of ditto $1\frac{3}{4}$ line; posterior ditto $2\frac{1}{4}$ lines; heel $3\frac{1}{2}$ lines; exterior flat, marked by horizontal undulating bands on the base, with a few vertical striæ near the heel; two depressions, broad and shallow; anterior outline abruptly curved upwards to the point. Stratum, great oolite: locality, Stonesfield.

4. *C. curvidens.*—Maxillary plate, right lower jaw: length 1 inch; depth at the symphysis 4 lines; ditto at the medial angle of the dental edge 5 lines; dental edge 7 lines; anterior division of ditto 3 lines; posterior ditto ditto 4 lines; heel 3 lines; exterior convex, curving rapidly inwards to the symphysis; exposed portion invested with a thick lustrous enamelloid coating, 3 lines in depth at the symphysis; base expanded and closely striated; one elongated depression near the heel; anterior division of the dental edge concave, posterior ditto straight. Stratum, great oolite: locality, Stonesfield.

5. *C. falcata.*—Maxillary plate, left lower jaw: length 1 inch; depth at the symphysis $3\frac{1}{2}$ lines; ditto at the medial parts of the dental edge 4 lines; heel 4 lines; dental edge 6 lines; tooth elongated, falcate, the point curved upwards; base shallow anteriorly, expanded and traversed by a broad depression near the heel; vertical striæ indistinct; horizontal bands broad and undulate; cutting edge concave, forming a single curve without any medial angle from the point to the heel. Stratum, great oolite: locality, Stonesfield.

6. *C. emarginata.*—Maxillary plate, left lower jaw: length 2 inches 5 lines; depth at the symphysis 1 inch 8 lines; ditto at the medial angle of the dental edge 1 inch 1 line; dental edge 1 inch 7 lines; anterior division 1 inch; posterior division 7 lines; heel (mutilated) 7 lines; exterior flat, marked by fine vertical striæ; depression at the heel circular, deep and broad; dental edge deeply indented in the form of two semicircles; symphysis straight. Stratum, great oolite: locality, Stonesfield.

7. *C. rugulosa.*—Maxillary plate, left lower jaw: length 1 inch; depth at the symphysis 4 lines; ditto at the medial angle of the dental edge 3 lines; dental edge $6\frac{1}{2}$ lines; anterior division 3 lines; posterior ditto $3\frac{1}{2}$ lines; heel $3\frac{1}{2}$ lines; exterior rugose; one strong depression near the heel striated vertically; anterior division of the dental edge concave; posterior ditto ditto nearly straight. Inner surface: triturating tubercles placed very obliquely. Stratum, great oolite: locality, Stonesfield.

8. *C. helvetica.*—Maxillary plate, right lower jaw: length 2 inches

5 lines; depth at the symphysis 1 inch 4 lines; anterior division of the dental edge 1 inch 4 lines; breadth of ditto 8 lines. This specimen being much mutilated, the measurements are incomplete. It approaches more nearly to *C. Mantelli* than to any other species. Stratum, molasse: locality, Œtmaringen, canton of Argovie.

9. *C. Dutetrii.*—Maxillary plate, left lower jaw: length 4 inches; depth at the symphysis 2 inches 2 lines; breadth of ditto 7 lines; depth at the medial angle of the dental edge 2 inches 2 lines; dental edge 3 inches 6 lines; anterior division of ditto 1 inch 8 lines; width of ditto 8 lines; posterior division of ditto 1 inch 8 lines. This tooth is broad and strong; the exterior is marked with indistinct undulations; the depression at the heel is nearly horizontal. Inner surface: symphysis rather oblique; the triturating tubercles broad, and worn down less obliquely than in *C. Townsendi,* to which species this most nearly approximates. Stratum, Kimmeridge clay: locality, Boulogne.

10. *C. Beaumonti.*—Maxillary plate, right upper jaw: length of the outer margin 3 inches 5 lines; length of the inner ditto 2 inches 8 lines; breadth at the base 1 inch 6 lines; depth of the symphysis 5 lines; breadth of the principal tubercle 6 lines; the upper surface is marked by a deep sulcus, 7 lines in width, running parallel with the symphysis; the inner surface has four triturating prominences, one anterior, two basal, and one intermediate. Stratum, Kimmeridge clay: locality, Boulogne.

11. *C. Dufrenoyi.*—Maxillary plate, left lower jaw: length 2 inches 4 lines; depth at the symphysis 1 inch 1 line; ditto at the medial angle of the dental edge 1 inch 4 lines; dental edge 1 inch 5 lines; anterior division of ditto 7 lines; breadth of ditto 5 lines; posterior division of ditto 8 lines; heel 1 inch; exterior slightly concave and uneven; inner surface contracts rapidly in diameter in the direction of the base; anterior tubercle 1 inch 6 lines in length by 6 lines in breadth, placed very obliquely; posterior tubercle small and narrow. Stratum, Kimmeridge: locality, Boulogne.

The author then enters into a detailed comparison of the fossil Chimæroids with the recent genera *Chimæra* and *Callorhynchus,* and after pointing out the discrepancies both of form and structure which they present, suggests the propriety of withdrawing them from the genus *Chimæra,* under which they have hitherto been arranged. The remainder of the memoir is devoted to a comparison of the fossil species with each other, and the author concludes by proposing to class them under three genera, as shown in the following tabular arrangement.

(1.) *Ischyodus* (ἰσχὺς robur, ὀδοὺς dens).

Two intermaxillary and two maxillary plates in the upper jaw; two maxillary plates in the lower jaw; intermaxillaries thick and strong, truncated more or less obliquely at their extremities. Structure: horizontal laminæ inclosed by parietes of coarse fibrous dentine.

Upper maxillaries: triangular plates articulating with each other and the intermaxillaries on the medial line of the palate; upper surface provided with a deep sulcus parallel to the symphysis for attachment to the jaw; under surface with four triturating prominences,

one in advance, one on the outer margin, and two side by side near the base, the larger one occupying the inner position; structure of the tubercles coarse and tubular; the remainder of the teeth fibrous and bony. Lower maxillaries: large and broad, formed for crushing rather than cutting; two tubercles, one at the heel, the other in advance; symphysis broad; the base invested by the membrane of the mouth, the crown by a coat of hard enamelloid dental substance; structure of the anterior angle as in the intermaxillaries, of the remainder as in the upper maxillaries; position of the plates more or less oblique.

SPECIES.	STRATUM.	LOCALITY.
Ischyodus, *Egerton.*		
Agassizi, *Buckl.*	Chalk-marl	Hamsey.
Beaumonti, *Egert.*	Kimmeridge clay..	Boulogne.
brevirostris, *Agass.*....	Gault	Folkstone.
Bucklandi, *Egert.*	Great oolite......	Stonesfield.
Colii, *Buckl.*	ditto..........	Ibid.
curvidens, *Egert.*.....	ditto..........	Ibid.
Dutetrii, *Egert.*	Kimmeridge clay	Boulogne.
Duvernoyi, *Egert.*	ditto..........	Ibid.
Egertoni, *Buckl.*......	ditto..........	Shotover.
emarginatus, *Egert.*...	Great oolite......	Stonesfield.
falcatus, *Egert.*	ditto..........	Ibid.
helveticus, *Egert.*	Molasse	Argovie.
Mantelli, *Buckl.*......	Chalk	Lewes.
neglectus, *Egert*......	Great oolite......	Stonesfield.
Oweni, *Buckl.*........	ditto..........	Ibid.
psittacinus, *Egert.*	ditto..........	Ibid.
rugulosus, *Egert.*	ditto..........	Ibid.
Tessoni, *Buckl.*	Oolite	Caen.
Townshendi, *Buckl.* ..	Portland	Milton.
Sedgwicki, *Agass.*....	Greensand	Cambridge.

(2.) *Elasmodus* (ἔλασμα lamina, ὀδοὺς dens).

Two maxillary and two intermaxillary plates in the upper jaw?

Two maxillary plates in the lower jaw; lower maxillary thick and strong; tubercle single, composed of a dental substance resembling in structure a tritor of Psammodus; in advance of the tubercle the tooth is composed of several series of laminæ, arranged in juxtaposition and inclined downwards and outwards; behind the tubercle the dental edge is notched, in consequence of a columnar structure pervading this region of the tooth. The outer surface is enveloped by a coat of dentine.

SPECIES.	STRATUM.	LOCALITY.
Elasmodus, *Egerton.*		
1. Greenovi*, *Egert.*		
2. Hunteri†, *Egert.* ..	London clay.	

* Chimæra Greenovii, *Agassiz.* † Chimæra Hunteri, *Owen.*

A single specimen in the Hunterian collection affords the type of a third genus.

(3.) *Psaliodus* (ψαλὶς forfex, and ὀδοὺς dens).

Upper jaw? Two maxillary plates in the lower jaw. Lower maxillary like *Chimæra*, but without a triturating tubercle; structure homogeneous; outer surface reticulated. Sp. *Psaliodus compressus*, Egerton. It is supposed to be from the London clay.

A paper was read "On the Locomotive and Non-locomotive powers of the Family Crinoidea." By J. C. Pearce, Esq., F.G.S.

The author is induced, from an examination of the various modes of attachment among the Crinoidea, to separate those animals into two great groups, the *Non-locomotive* and the *Locomotive*. The former, when once attached to any solid substance by their base or foot, were immoveably fixed; the latter possessed the power of grasping with the foot any substance, and again relaxing their hold at pleasure. The non-locomotive Crinoidea he subdivides into *solid-footed* and *root-footed*. In the solid-footed the foot is formed like an irregular cone with the base downwards, and is composed of successive laminæ, which envelope the inferior part of the column and increase in number as the animal advances in age. This base or foot is generally found firmly adhering to the rock in the fossil state, although specimens are sometimes found detached which appears to have been caused by violence during life. The columns of all the species which Mr. Pearce has examined are very short and destitute of side-arms. He enumerates *Encrinites moniliformis* from the Muschelkalk, *Apiocrinites rotundus* from the Bradford clay, and *Cyathocrinites tuberculatus* from the Dudley limestone, as examples of this group. In the non-locomotive root-footed Crinoids the base is composed of many root-like branches, radiating in a more or less horizontal or downward direction from the lower part of the column, each branch bifurcating several times in an irregular manner. The branches are perforated by a central foramen, and appear to be composed in individuals of all ages, of a solid calcareous substance incapable of motion.

Mr. Pearce divides his locomotive Crinoidea into two sections, *Branch-footed* and *Sucker-footed*. The branch-footed are characterised by the organ of attachment, or foot, being composed of a number of jointed branches, in some species simple, in others bifurcating, or dividing in an irregular manner, and generally terminating in a minute blunt point. Each joint has a central foramen, and is articulated by alternate radiating ridges and grooves, admitting of the greatest degree of flexibility, forming an organ which the author regards as well adapted to crawl along the bottom of the ocean, or to steady the animal against the motion of the water. The columns of this group are generally furnished with side-arms, extending to a greater or less distance from the foot, and sometimes the whole length of the column. Examples are, *Apiocrinites ellipticus* from the chalk, *Pentacrinus Briareus* from the lias, *Actinocrinites tessellatus*, *Platycrinites gigas*, and several undetermined species from the moun-

tain limestone; also *Cyathocrinites goniodactylus,* and several undetermined species from the Dudley limestone.

The sucker-footed locomotive Crinoids have the column destitute of side-arms, and terminating at its inferior extremity in a blunt point. Mr. Pearce subdivides them into *Crinoideform* and *Comatuliform.*

The following table exhibits Mr. Pearce's views of the classification of the family Crinoidea.

Fam.	Group.	Division.	Subdivision.	Genus.	Species.
Crinoidea.	Non-locomotive	Solid-footed ...	....	Apiocrinites	rotundus.
				Encrinites	moniliformis.
				Cyathocrinites	tuberculatus.
				Eugeniacrinites	nutans.
				———	quinqueangularis.
		Root-footed......	....	Cyathocrinites	rugosus.
	locomotive	Branch-footed...	....	Apiocrinites	ellipticus.
				Pentacrinus	Briareus, jun.
				Actinocrinites	tessellatus.
				Platycrinites	gigas.
				Cyathocrinites	goniodactylus.
		Sucker-footed	Crinoideform	Actinocrinites	moniliformis.
			Comatuliform.	Apiocrinites	fusiformis.

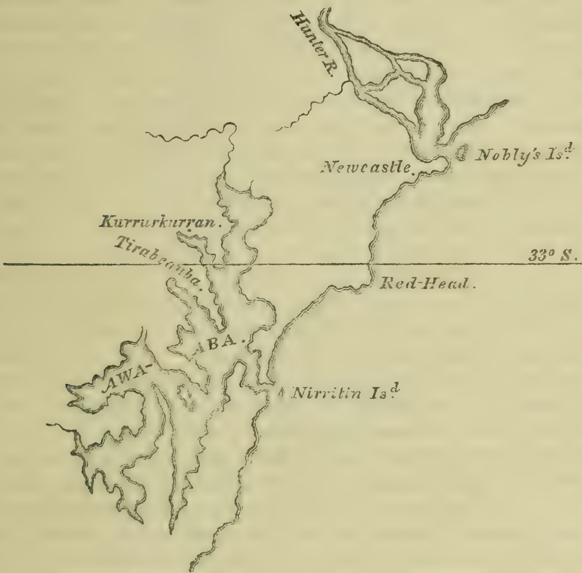
"On an entirely new form of Encrinite from the Dudley Limestone." By J. Chaning Pearce, Esq., F.G.S.

The fossils described in this communication were discovered by Mr. John Gray of Dudley. Mr. Pearce regards them as constituting a new genus which he proposes to name *Pseudocrinites,* including two species both having "the arms and fingers inserted in bands, which commence just above the column and pass over the plates of the head to its summit." The one form has two, the other four ranges of "fingers." They resemble each other in having "the columns at their superior part composed of rings, gradually increasing in size towards the head. The plates of the head are thin and broad, and marked on their outer surface by lines of growth, and radiating ridges resembling the plates of the marsupite. They are also furnished with four orifices of a lozenge shape, most singularly inserted in the plates of the head, and their arms and fingers are exceedingly short. The fingers are composed of two rows of bones, each bone on the one side being inserted between two of the opposite. These fingers appear to be placed in four rows on each of the hands, and pass off from the head in a radiating direction, commencing at the column and uniting at the summit." Mr. Pearce names the first species *Pseudocrinites bifasciatus,* and the second *P. quadrifasciatus.*

"On a Fossil Pine-forest at Kurrur-kurrân, in the inlet of Awaaba, on the eastern coast of Australia," by the Rev. W. B. Clarke, A.M., F.G.S.

Awaaba is one of those inlets which occur at frequent intervals along the eastern coast of New South Wales, and which, from their

sea-entrance being usually narrow and blocked up with drifted sand, are by the colonists termed "*Lakes*." Awaaba is called Lake Macquarrie, and is the largest of the inlets of that description between Port Stephen and Broken Bay. Its sea-entrance lies fourteen miles to the south of the mouth of the Hunter river, nearly in 33° south latitude.



This inlet occupies a portion of that formation of conglomerate and sandstone, with subordinate beds of lignite, which extends from the Hunter river southwards towards Brisbane Water. The lignite constitutes the so-called Australian coal. This formation, owing to its beds along the shores of the inlet being placed horizontally, and being divided by nearly vertical joints, gives rise to regular lines of coast, both in a longitudinal and transverse direction. It forms along the coast a high range, which, except at the entrance, divides the lake from the sea. Within the lake a series of extensive bays, bounded to the water's edge by steep cliffs, run out like fingers, far up into the country. The water of the inlet is for the most part very deep.

On the western side of the lake, and nearly opposite its sea-entrance, a promontory, bounded on either side by a bay, is formed by the Tirabeenba mountain, which stretches from the S.E. to the N.W., and in the latter direction ends abruptly in a lofty but not very precipitous escarpment: this sudden termination is occasioned by a fault. This mountain range then turns to the W., and afterwards to the S.W.; between it and the next range a wide valley intervenes.

The north-eastern flank of the north-western extremity of this range swells out into a hill of low elevation, from the base of which to the water's edge a low flat extends; the flat is about fifty yards broad, and is, in point of level, within a foot of the surface of the water; it continues along the base of the slope for the space of about half a mile: it is called by the aborigines Kurrur-kurrân. To the south and west of this flat the slopes of the mountain come down to the margin of the lake. The surface of the flat is composed of black sandy vegetable mould, and of detritus thickly interspersed with the roots of plants and grasses; trees of large growth, which are principally Eucalypti and Casuarinæ, together with some others of smaller dimensions, stand at intervals upon it, and grow even close to the water. Beneath the alluvial matter the rock occurs *in situ*: this is a sandstone, which is for the most part of a compact and semi-crystalline texture, approaching to chert; its strata run out to some distance, at a small depth below the surface of the water, and render the lake in that part very shallow.

Throughout the whole of the alluvial flat, stumps and stools of fossilized trees are seen standing out of the ground, and one can form no better notion of their aspect, than by imagining what the appearance of the existing living forest would be if the trees were all cut down to a certain level. In the lake also, where it adjoins the flat, to the distance of from 80 to 200 feet from the shore, numerous points are seen, like those of a reef of rocks, just peeping above the surface of the water; these points are the fossilized stools and stumps of tree, similar to those which are found on shore. The greater part of these stems, both of those on land and in water, stand vertically; many of those on shore have remains of their roots in the sandstone rock beneath the alluvial matter; and of those which stand in the water, one at the distance of three feet from the shore has portions of its roots imbedded in the sandstone on which it rests. The rock immediately round the roots is not of so harsh a texture as it is in other parts; in it, in the neighbourhood of the roots which are in the water, there appear numerous white spots, which give the stone a mottled appearance: this arises from a multitude of small cavities which contain powdery silex, similar to what is often found in the cavities of chalk-flints. On the shore, the surface of the rock near the stems is worn into a number of little holes, which are owing to the decay and removal of this powder. Mr. Clarke sees no other explanation of these specks, than that they mark the situation of the fibres which proceeded from the roots. The roots of the trees are in some instances surrounded by an accumulation of sandy rock, which forms a mound of a higher level than the rest of the stratum. The roots do not descend, so far as has been ascertained, very far into the substance of the rock. nor is there any appearance of a dirt-bed. The stools stand from two to three feet above the surface of the ground, and vary from two to four feet in diameter; but one in the lake is at least four feet above the level of the water, and five or six feet in diameter. In several of the stumps from 60 to 120 concentric rings of growth may be counted: a few of the stools are hollow

in the centre, but others are solid throughout: the wood appears to be coniferous. Veins of chalcedony traverse the substance of the trunks between the concentric rings, and also in the direction of the radial lines.

Many of the stems at Kurrur-kurrân have the bark adhering firmly to the trunk, and the bark in one instance was of the thickness of three inches. Its appearance in one or two cases was such as to show that it had been partly torn from the tree while yet standing, as if it had been broken down and the bark had been rent by the fall.

The colour of the substance of the stems within varies from a greyish white to a clouded grey, but their surfaces, when exposed to the air, have become yellowish by weathering; many are overgrown by lichens, and have then exactly the appearance of the stumps of recent trees. The upper extremities of the fossil stumps present clean horizontal sections, which shows that they were not broken off while recent, since no mode of fracturing recent pinewood could have occasioned such neat, plain and parallel sections as the summits of these stumps exhibit.

In a fragment of the sandstone from the base of one of the fossil stumps, the silicified impression of part of the leaf of a Glossopteris was found.

Immediately below the flinty stratum in which the trees are found is a bed of lignite; above the level at which the trees occur, there are found, imbedded in the sandstones and conglomerates, immense quantities of broken fragments of trees, apparently stripped of their boughs and branches. These fragments are generally divested of their bark, and appear to have been drifted.

Fossil trees are found in this formation at other places, and nearly at the same level above the sea as at Kurrur-kurrân; they occur in sandstone similar to that of Kurrur-kurrân, at the southern extremity of the Tirabeenba mountain, immediately above and below a bed of lignite. At the spot referred to, pits have very recently been opened for working the lignite, at the level of about four feet above the surface of the lake. At the south head of Reid's Mistake, which is the name for the sea-entrance to the inlet of Awaaba, similar beds of sandstone occur, and these are traversed vertically by the trunks of trees, while other trees lie horizontally in the same beds. Lines of division, which appear to be owing to the contraction of the whole mass, intersect both the trees and their matrix: these trees are found at a somewhat higher level than the sea. At nearly the same level in Nirritinbali (or Mutton-bird Island), off the entrance to Awaaba, large stools and stems of trees occur in conglomerate, which conglomerate reposes on beds of lignite. Fossil trees are also found in conglomerate reposing on lignite on the coast north of the entrance to Awaaba, at Redhead, at Newcastle, and at Nobby's Island, off the mouth of the Hunter river. At Nobby's Island the trees lie in a pebbly grit, passing into conglomerate, and are mineralized by hydrate of iron; they are from 10 to 150 feet long. At none of the above places, however, do the trees occur in such profusion as at Kurrur-kurrân.

Fragments of roots and of the boughs of trees, divested of their bark, are found at Munniwarrée, Wollogong and Mulibinbak, imbedded in beds of sandstone at a higher level than the beds which contain the fossil trees. Similar fragments are found spread over the surface at Wollon Hill, at Holworthy Down, and elsewhere in the colony; it is probable therefore that the bed of sandstone containing trees in a vertical position, which is found nearly at the same level above the sea at Kurrur-kurrân and the other places abovementioned, is the true geological position of that ancient forest from which the enormous quantities of the fragments of wood which occur either spread over the surface, or imbedded in the sandstone above and below the lignite, have been derived.

The sandstones of this formation, and in this vicinity, have been powerfully affected by the action of intrusive rocks; they are traversed, at Nobby's Island and on the coast near Newcastle, by trap dykes. The author refers to the 'Voyage' of Flinders, page 131, for an account of mineralized fossil wood found in Bass's Straits, at Reservation Island, which is composed of granite and of schist, traversed by granite veins and trap dykes. He also refers to the 'Tasmanian Journal,' vol. i. p. 27, for an account, by the surgeon of H.M.S. Erebus, Dr. M'Cormick, of silicified wood found in association with trap rocks in Kerguelen's Land; and to the same volume, p. 24, for an account by Dr. T. D. Hooker, assistant-surgeon to H.M.S. Erebus, of fossil wood found at Macquarrie plains, in Tasmania.

The author infers, from the present position of the fossil trees at Kurrur-kurrân, that the land must have been alternately depressed and elevated. He makes mention in the course of his paper of two beds of lignite, one above the bed of fossil trees and one below it; but he does not describe the relative position and distance of these two beds.

March 22.—A paper was read "On some Pleistocene Deposits near Copford, Essex," by John Brown, Esq.

The order of the component beds of these deposits was taken from a cutting made for the Eastern Counties Railway. The lowest bed noticed consists of blue clay, which the author refers to a great detritic accumulation called "till," and which occurs extensively over the northern portion of the county of Essex. The till varies considerably in character and composition; at the N. extremity of the section which the author exhibited, it was described as consisting of a stiff tenacious clay, but within a short space it changed to a sandy gravel, containing fishes' teeth and corals in great abundance: the rock fragments have been derived from basaltic and secondary beds; the latter afforded the fossils contained in the following list, for the identification of which the author states that he has been indebted to Mr. J. de C. Sowerby. *Serpula illium*, L.; *S. tetragona*, L.; *S. articulata*, G. S.; *S. granulata*, C.; *Terebratula rigida*, U. Ch.; *T. pisum*, Ch. M.; *T. striatula*, L. Ch.; *Gryphæa incurva*, L.; *G. dilatata*, K. C.; *Inoceramus*, C.; *Avicula inæquivalvis*, L.; *Exogyra virgula*, K. C.; *Crania striata*, C.; *Pollicipes maximus*, C.; *Ammonites Leachii*, K. C.; *A. annulatus*, L.; *A. dentatus*, G.; *A.*

spinosus, K. C.; *A. serratus*, O. C.; *Belemnites acutus*, L.; *B. pistilliformis*, L.; *Littorina carinata*, G. S.; *Pentacrinites basaltiformis*, L.; *Encrinites moniliformis*, O. The remains of fishes were, *Otodus appendiculatus*, C.; *Galeus pristodontus*, C.; *Notidanus pristis*, C.; *Odontaspis rhaphiodon*, C.; *Hybodus*, U. O., which were determined for the author by Mr. S. P. Woodward.

The Pleistocene deposit at the Copford brick-field consists, in an ascending order, of a bed of black vegetable matter, or peat, from six inches to one foot in thickness, resting immediately upon the "till:" from this stratum the following shells were procured, which were named for the author by Mr. S. P. Woodward:—*Vertigo palustris*; *V. edentula*; *V. pusilla*; *V. pygmea*; *V. substriata*; *Azeca tridens*; *Acme fusca*; *Carychium minimum*; *Zua lubrica*; *Clausilia rolphii*; *Cl. nigricans*; *Cl. bidens*; *Succinea pfeifferi*; *S. putris*; *Aplexus hypnorum*; *Limnius palustris*; *L. truncatulus*; *Planorbis spirorbis*; *P. vortex*; *Pisidium pusillum*; *Helix nemoralis*; *H. hortensis*; *H. arbustorum*; *H. lapicida*; *H. rufescens*; *H. hispida*; *H. pulchella*; *H. lamellata*; *H. spinulosa*; *H. fulva*; *Zonites rotundatus*; *Z. ruderata*; *Z. cellarius*; *Z. radiatulus*; *Z. nitidulus*; *Z. luridus*; *Z. crystallinus*; *Pupa anglica*; *P. umbilicata*; *P. marginata.*

Above the peat is a bed of clay and detritus about one foot thick, containing many of the land and freshwater shells cited above; next above this is a second layer of peat with shells.

At the southern extremity of the author's section, the order of the beds was as follows:—1. Diluvial clay, 3 feet. 2. White sand with shells, 3 feet. 3. White calcareous marl with shells, together with the bones of the elephant, ox and deer. 4. Peat with shells (*Valvata piscinalis*), 6 inches. 5. Blue clay with freshwater shells.

The author suggests that this deposit is the bed of an ancient pond, which occupied a depression on the surface of the till.

ZOOLOGICAL SOCIETY.

Feb. 14, 1843.—William Yarrell, Esq., Vice-President, in the Chair.

Mr. Gould exhibited and characterized the following two new species of Birds, from the collection formed by Capt. Sir Edward Belcher, R.N., during the voyage of Her Majesty's Ship 'Sulphur.'

Pteroglossus erythropygius. *Pt. vertice, facie, mento, et dorso superiore nitidè virescenti-nigris; alis caudâque sordidè fuscescenti-viridibus; dorso inferiore, uropygio, et caudæ tectricibus splendidè sanguineis; corpore inferiore flavo, pectore superiore sanguineo tincto, inferiore vittâ coloribus nigro et sanguineo commixtis, fasciato.*

Crown of the head, sides of the face, chin, and upper part of the back shining greenish black; wings and tail dull brownish green; lower part of the back, rump, and upper tail-coverts shining blood-red; under surface yellow, stained on the chest with blood-red, and crossed on the breast by a band of mingled black and blood-red; bill bordered at the base by a narrow line of dull white; the remainder of the bill yellowish horn colour, with a broad stripe of black along

the upper mandible near the cutting edge, and the tip of the under mandible black; feet greenish black.

Total length, 18 inches; bill, 5; wing, $6\frac{1}{4}$; tail, $7\frac{1}{2}$; tarsi, $1\frac{1}{4}$.

PTEROCLES PERSONATUS. *Pt. plumis a basi rostri, usque ad oculos, intensè nigris; capitis reliquis partibus, collo, et pectore arenaceo-cervinis, non sine tincturâ vinosâ ad basim colli; dorso vinoso-fusco; caudæ tectricibus pallidè fuscis, notis irregularibus cervinis per plumas in lineis obliquis ordinatis, crebrè guttatis.*

Fœmina facie nigrâ caret.

Male.—Feathers surrounding the base of the bill, as far as the eyes, deep velvety black; remainder of the head, as well as the neck and chest, sandy buff, tinged with vinous at the base of the neck, both above and below; back vinous brown; wings sandy buff, the coverts tipped with dark brown, which colour forms three semicircular fasciæ across the wing; primaries and secondaries dark brown, the latter marked irregularly with sandy buff on the basal half of their outer margins; rump and upper tail-coverts light brown, with numerous irregular marks of buff, arranged in oblique lines down the length of the feathers; tail-feathers deep brown, crossed on their outer webs with decided, and on the inner with irregular, bars of buff, all the feathers largely tipped with buffy white, all the under surface crossed with small bars of dark brown, light brown, and buff; under tail-coverts sandy buff.

The female differs in not having the black face, in having all the upper as well as the under surface of the body barred, like the latter part in the male; the wings numerously barred with brown, and the under tail-coverts sandy red.

Total length, 13 inches; bill, $\frac{7}{8}$; wing, $8\frac{3}{4}$; tail, 4; tarsi, 1.

Mr. Fraser laid before the Meeting eight new species of Birds from Western Africa, which he thus characterizes:—

COLLURIO SMITHII. *Coll. supernè niger, plumis scapularibus, guttâ apud primarias, secundariarum nonnullarum apicibus sic et corpore subtùs, rectricumque caudæ quatuor externarum apicibus albis; rostro pedibusque nigris.*

Long. tot. 8 poll.; rostri, $\frac{3}{4}$; alæ, $3\frac{1}{4}$; caudæ, $4\frac{1}{2}$; tarsi, $\frac{3}{4}$.

Hab. Cape Coast.

This species is named in honour of Dr. Smith, the author of the 'Illustrations of the Zoology of South Africa.'

DRYMOICA MENTALIS. *Drym. suprà fusca, primariis ad marginem pallidioribus, subtùs rufescens, fronte genisque rufo-castaneis, gulâ et lineâ angustâ superciliari albis; lineâ angustâ nigrâ inter gulam albam, genasque castaneas; caudâ?; rostri mandibulâ superiore nigrâ, inferiore corneâ; tarsis flavis.*

Long. tot.? poll.; rostri, $\frac{3}{4}$; alæ, $2\frac{3}{4}$; caudæ, ?; tarsi, 1.

Hab. Accra.

DRYMOICA STRANGEI. *Drym. suprà fusca, strigâ superciliari et corpore subtùs albis; rectricibus caudæ subtùs saturatè cinereis, guttâ nigrâ propè apices, apicibus albis.*

Long. tot. $5\frac{1}{4}$ poll.; rostri, $\frac{3}{4}$; alæ, $4\frac{1}{2}$; caudæ, 2; tarsi, 1.

Hab. Accra.

"I have ventured to name this species after Lieut. J. N. (now Commander) Strange, R.N., to whom I was indebted for kindness and assistance throughout the whole term of the expedition."

Drymoica lateralis. *Drym. suprà fusca, lateribus cinerascentibus, subtùs alba, femoribus rufis, rectricibus caudæ subtùs saturatè cinereis, guttâ nigrâ propè apices, apicibus albis.*

Long. tot. $5\frac{1}{2}$ poll.; rostri, $\frac{3}{4}$; alæ, $2\frac{1}{2}$; caudæ, 2; tarsi, $\frac{3}{4}$.

Hab. Cape Palmas.

Differt a *Drym. Strangei* corpore suprà saturatiore, lateribus cinereis, caudâ magis gradatâ, cum colore albo apicali magis circumscripto, et obscuriore.

Drymoica ruficapilla. *Drym. ♂ vertice rufo, corpore suprà saturatè fusco, corpore toto inferiore et gulâ albis, dimidio femorum inferiore rufo; caudâ ut in* D. laterali, *at magis gradatâ; rostro nigro.*

Long. tot. $6\frac{3}{4}$ poll.; rostri, $\frac{5}{8}$; alæ, $2\frac{1}{2}$; caudæ, $2\frac{1}{2}$; tarsi, $\frac{7}{8}$.

Hab. River Nùn, Western Africa.

This species differs from others of the genus here described in having the white of the under parts extending to the nostrils, a rufous crown to the head, and a black beak. It was shot near the mouth of the above-mentioned river in the month of August.

Drymoica rufa. *Drym. suprà rufa, subtùs sordidè flava, rostro tarsisque flavis.*

Hab. River Quorra, opposite Iddah.

Drymoica rufogularis. *Drym. ♀ suprà fuliginosè fusca, levitèr viridi tincta; gulâ pectoreque rufescentibus; abdomine, tectricibus alarum inferioribus et caudâ utrinque rectricibus tribus externis albis; rostro suprà nigro, subtùs flavo; tarsis carneis, iridibus pallidè rufescenti-fuscis.*

Long. tot. $3\frac{3}{4}$ poll.; rostri, $\frac{1}{2}$; alæ, $1\frac{3}{4}$; caudæ, $1\frac{5}{8}$; tarsi, $\frac{3}{4}$.

Hab. Clarence, Fernando Po.

Drymoica uropygialis. *Drym. suprà fusca, singulis plumis pallidiore marginatis, strigâ superciliari et corpore subtùs albis, lateribus et femoribus levitèr rufo-lavatis, uropygio subrufo; caudâ saturatè fuscâ, fasciâ perpallidè rufâ, alterâ nigrâ, et apice albo, rostro fusco, tarsis flavis.*

Long. tot. 4 poll.; rostri, $\frac{1}{2}$; alæ, 2; caudæ, $1\frac{1}{2}$; tarsi, $\frac{3}{4}$.

Hab. Accra.

A series of Shells were laid before the Meeting, upon which Mr. Hinds observed that they constituted the first portion of a collection which it is proposed, from time to time, to bring under the notice of the Society. The collection was made by Captain Sir Edward Belcher, R.N., C.B., during the late voyage of Her Majesty's Ship 'Sulphur,' aided by the cooperation of Mr. Hinds, the surgeon of the vessel. The following descriptions are by Mr. Hinds:—

Trichotropis cancellata. *Tri. testâ oblongâ; anfractibus senis, rotundatis, costatis, valdè cancellatis; costis setosis; anfractu ultimo infrà subplanulato; suturâ profundâ; aperturâ rotundatâ, ad basin truncatâ; umbilico parvo lineari, labio inferno ferè occulto.* Axis 8 lin.

Hab. Sitka, North-west America. Dredged in the harbour from a sandy bottom, in from five to seven fathoms, together with *T. inermis*.

Shell oblong, the spire more produced than in *T. bicarinata*; the whorls separated by a deep suture, profoundly cancellated; many-keeled, and furnished on the lines of the striæ of increase with numerous short bristles at regular intervals. The aperture is rounded, and truncated at the base; the canal so short as scarcely to exist. Umbilicus small, and somewhat concealed by the inner lip, which is slightly developed.

Three specimens are in the collection, and one, being a dead shell and deprived of its epidermis, shows very distinctly the deep cancellation of the whorls. A single specimen, and larger by two lines, is in the possession of Mr. Cuming, who obtained it with some shells from the north-west coast of America, the measurement of which I have adopted.

Trichotropis inermis. *Tri. testâ ovatâ, solidulâ; anfractibus quaternis rotundatis, multicostatis, longitudinaliter lævissimè striatis; costulis subæqualibus, planulatis, inermibus; aperturâ oblongâ, canali brevi desinente; umbilico mediocri; labio interno producto.* Axis $7\frac{1}{2}$ lin.

Hab. Sitka, North-west America. In company with the preceding.

In shape and outline this shell approaches *T. borealis*. It will be readily distinguished from any hitherto known species by the absence of armature on the epidermis, in which we lose sight in the instance before us of one of the characters of the genus. The whorls are rounded and separated, as in the other species, by a deep suture. The last whorl is remarkable for the strong ridges which it bears at rather distant intervals, marking the termination or commencement of the periodical stages of growth.

In the method of formation of the canal there is a close affinity in this shell to some *Cancellariæ*, particularly in the angular-mouthed species, and the affinity is extended to the character of the whorls and their connexion by the suture.

Trichotropis flavida. *Tri. testâ oblongâ, tenui; spirâ elatâ; anfractibus septenis tricostatis, ultimo infernè quadricostato; epidermide pallidè corneâ indutâ; aperturâ angulatâ, ad basin obliquè truncatâ; canali brevissimo; umbilico parvo, lineari.* Axis 8 lin.

Hab. —— ?

Allied to *T. cancellata*, but is a more delicate and elongated shell; and the epidermis, though having some shreds attached to it, is destitute of the bristled armature. A single specimen is in the collection of Mr. Cuming, without any history.

Typhis quadratus. *Typ. testâ subquadratâ, fuscâ vel albidâ, lineis pallidis transversis; quadrifariam varicosâ; varicibus crassis, acutis, ad spiram commixtis, supernè nodulosis, in spinis appressis desinentibus; tubulis subrectis vel deorsùm inclinatis; canali mediocri laterali.* Axis 11 lin.

Hab. Gulf of Nicoya and the Bay of Guayaquil. Dredged from a muddy bottom in from seven to eighteen fathoms.

Allied to *Typhis Sowerbii*, but distinguished from it by its squarish shape, thick and nodulous varices, closely appressed spines, and the decided lateral direction of the canal.

TYPHIS ARCUATUS. *Typ. testâ corneâ, fusiformi; quadrifariam varicosâ; varicibus arcuatis, inermibus, ad spiram benè distinctis, supernè in tubulis desinentibus; tubulis complanatis, ascendentibus; canali mediocri recurvo.* Axis $5\frac{1}{2}$ lin.

Hab. Cape of Good Hope. Dredged on the L'Agulhas Bank in from forty to fifty-four fathoms.

Shell fusiform, of a horn-colour; the varices arcuate, terminating in the tube, and ascending the spire even to the apex, giving it a pyramidal shape. The character of the bowed spineless varices is peculiar, and altogether it is a very distinct species.

TYPHIS NITENS. *Typ. testâ ovali, albidâ, lævigatâ, nitidâ; quadrifariam varicosâ; varicibus acutis in spinis excentricis desinentibus; tubulis rectis; canali brevi recurvo.* Axis 4 lin.

Hab. Straits of Macassar, Indian Archipelago. Dredged from among gravel and coral in eighteen fathoms.

Looking from the apex, the spines and tubes will be seen to be disposed in an elegant spiral manner about the spire. It is the first species, as far as I am acquainted, that has hitherto been found in the Indian seas, and is at the same time the smallest yet recorded.

MISCELLANEOUS.

ON THE MICROSCOPE. MEANS OF REMEDYING THE DEFECT OF ARTIFICIAL LIGHT. BY J. W. GRIFFITH, MD., F.L.S. *

It must have been repeatedly noticed by microscopic observers of any experience, that the only agreeable time for making minute observations is during daylight, and that examinations made at this time only can be relied on. The pure white daylight, furnished by reflection of the sun's rays from large floating cumuli, is that which best illuminates microscopic objects; whilst the orange or reddish-yellow light of a lamp or candle wearies the eye incomparably more than the softness of daylight. There is also a marked glare with candle or lamplight: this is very annoying to most observers; so much so as to compel many to use the microscope by daylight alone, which few can have the opportunity of doing. To remedy this defect of artificial light, by showing the method of rendering it as white as daylight, is the object of the present communication.

The imperfections of lamp or candlelight appear to me to arise mainly from two causes: 1st, its being monochromatic; 2ndly, the colour in excess being that which is most intensely luminous, viz. yellow. The first renders us totally unable to appreciate colour; the second causes a very unpleasant and injurious glare. It occurred to me that these might be overcome from the following considerations.

It is well known, that by the combination of a certain colour form-

* From the Medical Gazette, for Nov. 25, 1843.

ed by the mixture of those existing in one portion of the spectrum with that formed from the mixture of those remaining, that white light is produced. The two colours formed by these combinations, each consisting of that colour which the other requires to compose white light, are called, for that reason, complimentary to each other. All we have to do, then, to render a reddish-yellow light white, is to mix with that colour the complimentary one. The colour must vary according to the nature of the light and the quality of the combustible: if the light be reddish, a pale green glass, in addition to the blue, will be requisite. The readiest mode of ascertaining the proper tint is to fit the polariscope to the microscope; then to place in the stage some crystallized salts belonging to any other system than the cubic; next to arrange the analyzer and polarizer so that their planes of polarization are at right angles: by examining thus several crystalline specimens, a portion may be always found which is of exactly the same colour as that of the flame (which must be found out by comparison); by then turning round the analyzer, so that the planes of polarization become parallel, the complimentary blue tint will be found, and a piece of glass of this colour will be the requisite one.

In applying this principle to the illumination of microscopic objects, I found that by passing the light, in its passage from the candle or lamp, through a piece of deep-blue glass, I could render the light, as I had anticipated, perfectly colourless. By this light bodies can be examined by night with the same perfection and accuracy as in daylight, without that fatigue occasioned by the monochromatic light; moreover, colours are distinctly recognised.

The modes of applying this contrivance are numerous: a substance soluble in tallow, and supplying the requisite tint during combustion, may be added in the formation of candles; or another head may be added to the illuminator of opake objects, and a plate of glass of the proper colour fixed in it, this being placed as near the light as possible, and between it and the mirror of the microscope. Again, a piece of the coloured glass may be fixed in the condenser ordinarily used for transparent objects, or the lamp-glass itself may be made of the requisitely coloured material. The method of effecting this properly is to select the coloured glass by daylight, illuminating the microscope by a candle or lamp, and then placing the glass between the light and the mirror; the field will, if the glass be of a proper colour, appear of the same tint as the cloud light.

[We are informed by our correspondent, that in the preservation of objects for the microscope in the liquid state, a solution of Canada balsam in sulphuric æther, of such a state of viscidity as is just sufficient to allow it to be laid on with a pen or stick, has answered better than any of the means published in his former paper*. Another very excellent mode is using gold-size and white lead; this is an excellent compound for the same purpose.—Ed. *Ann. Nat. Hist.*]

* Page 113 of the present volume.

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END OF THE TWELFTH VOLUME.

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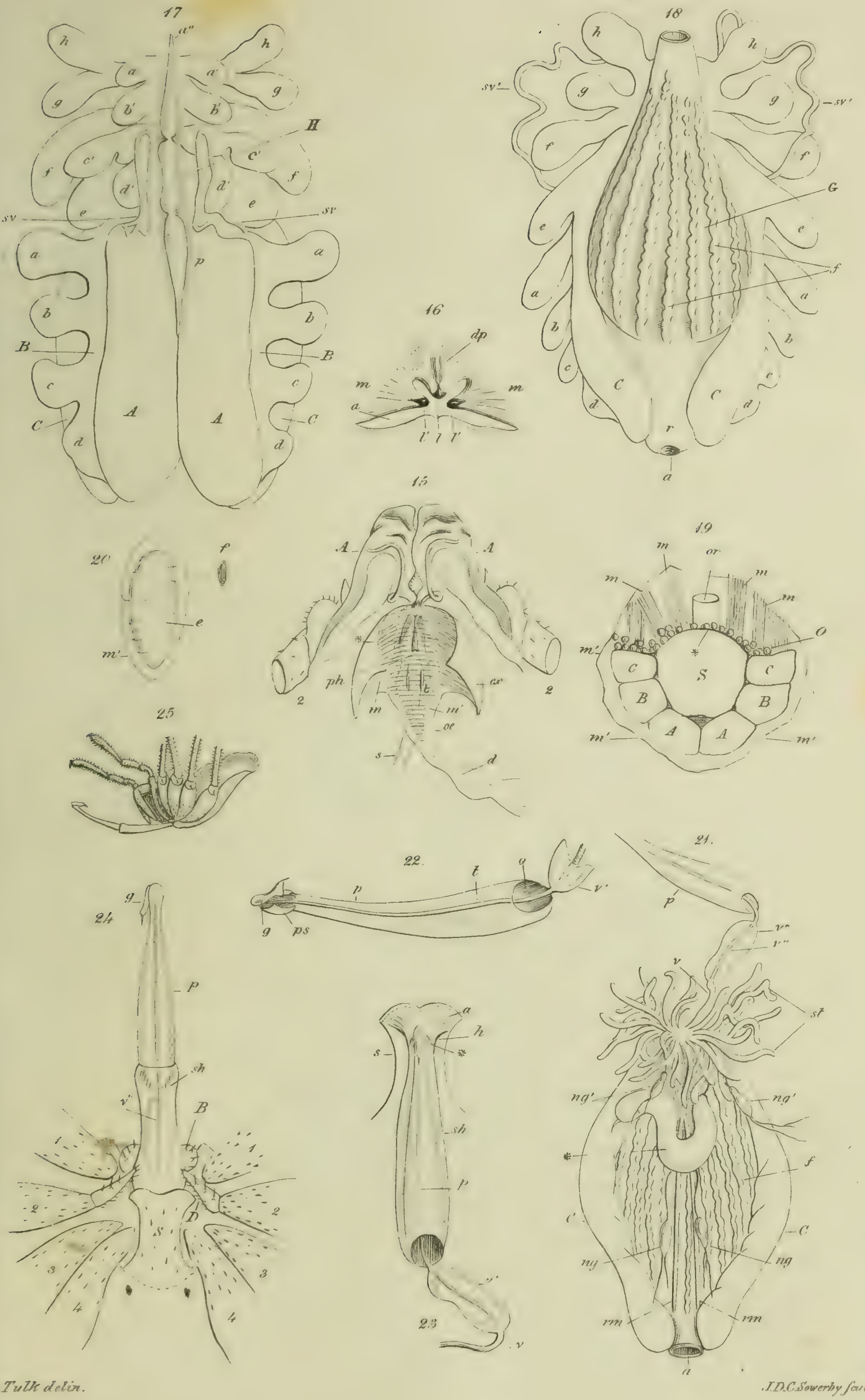

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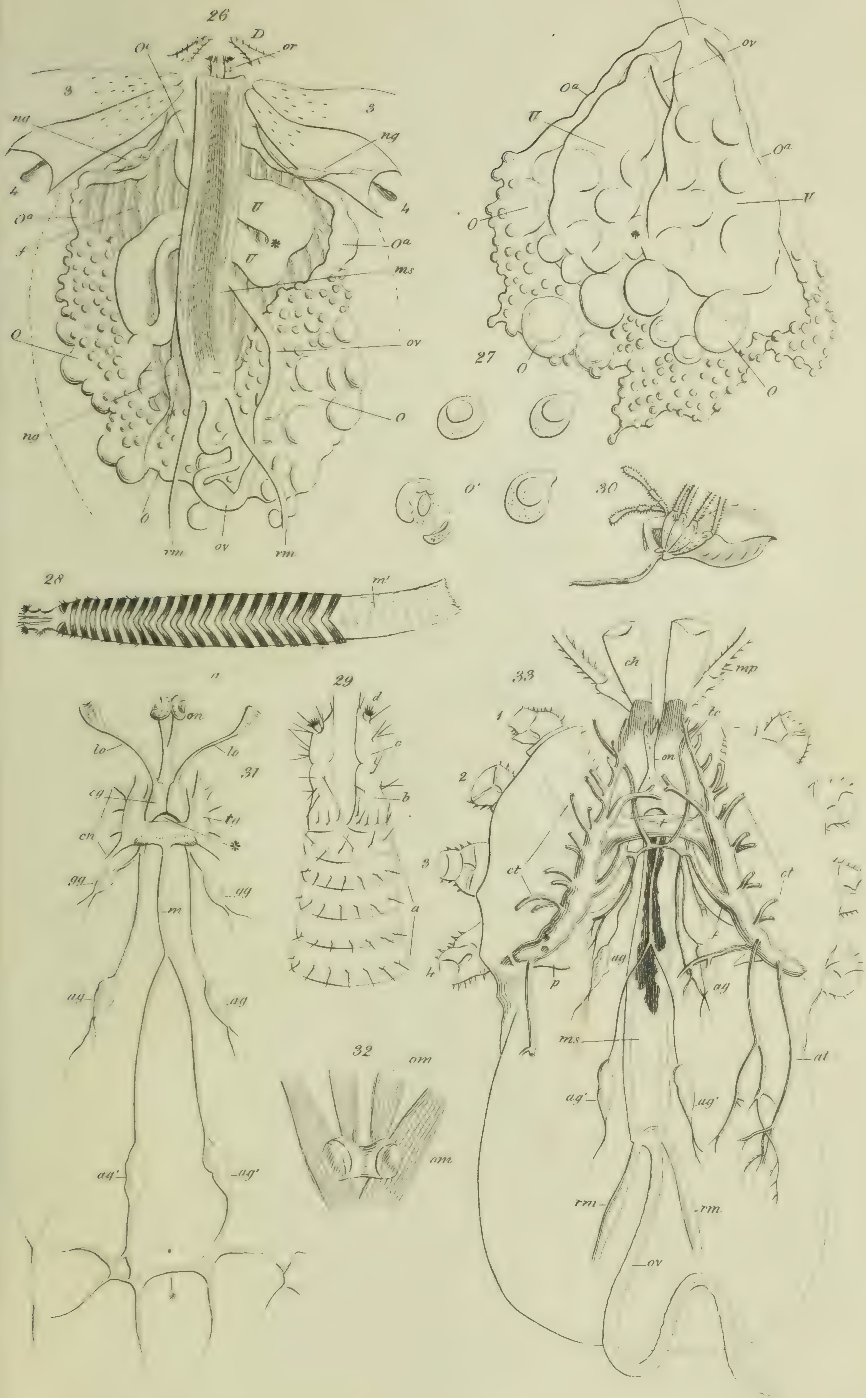

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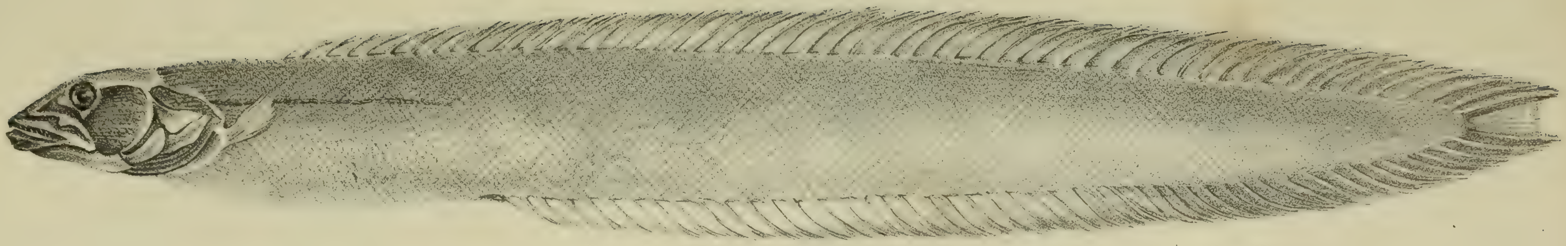

Machærium subducens, *Rich.*

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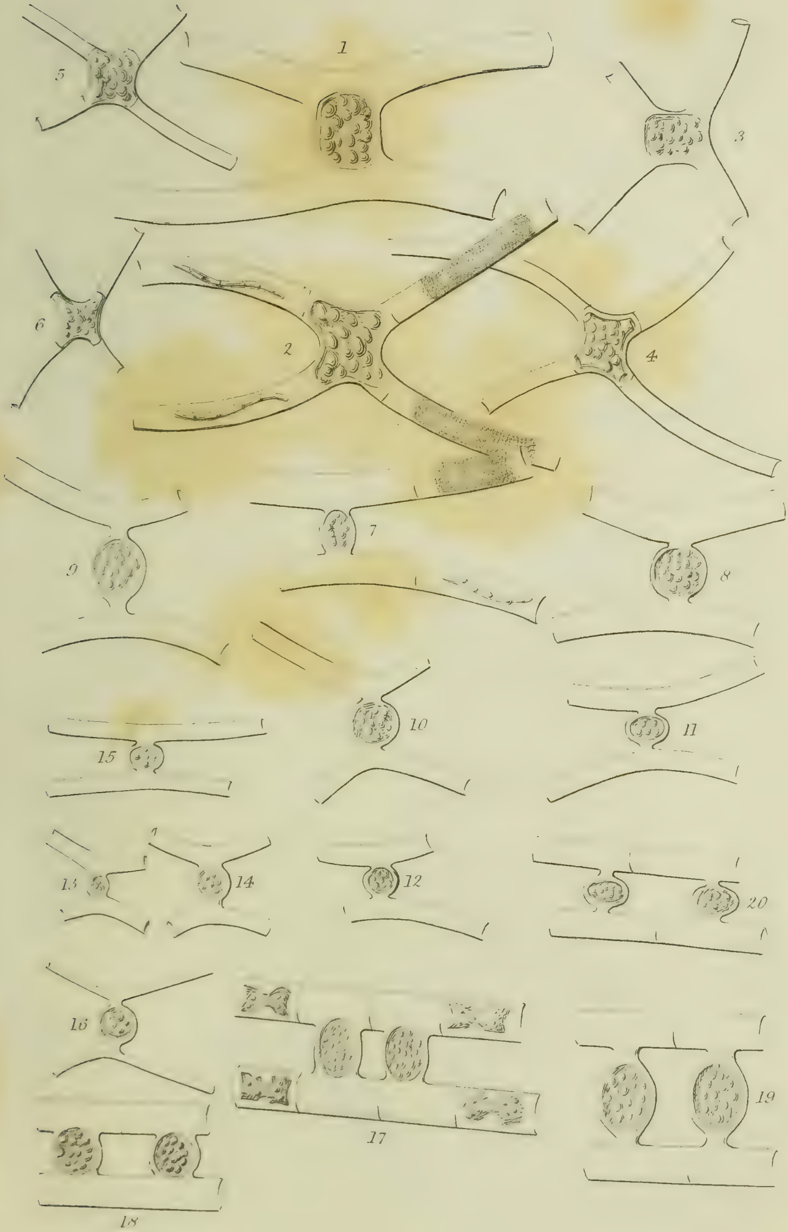
8, King William St Strand.



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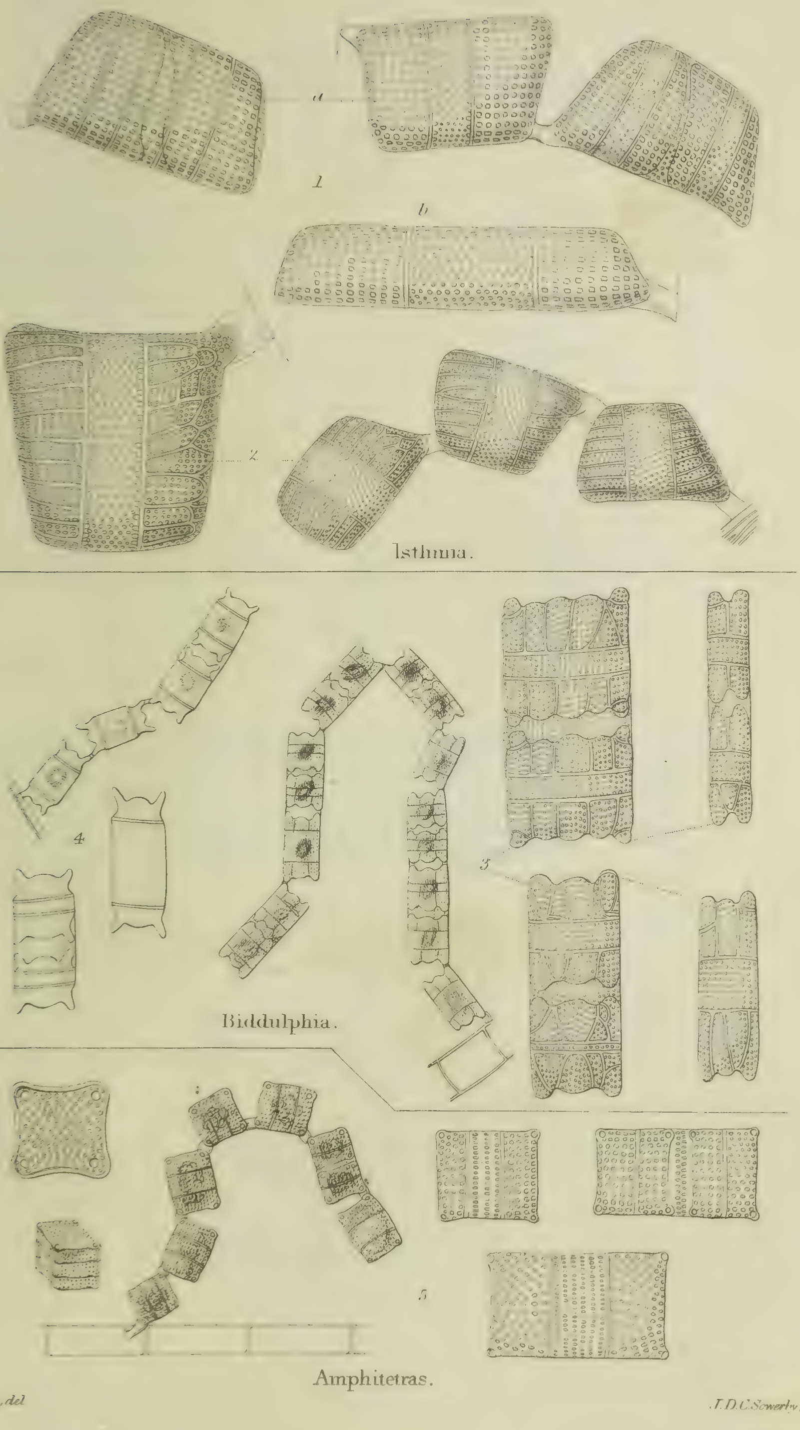

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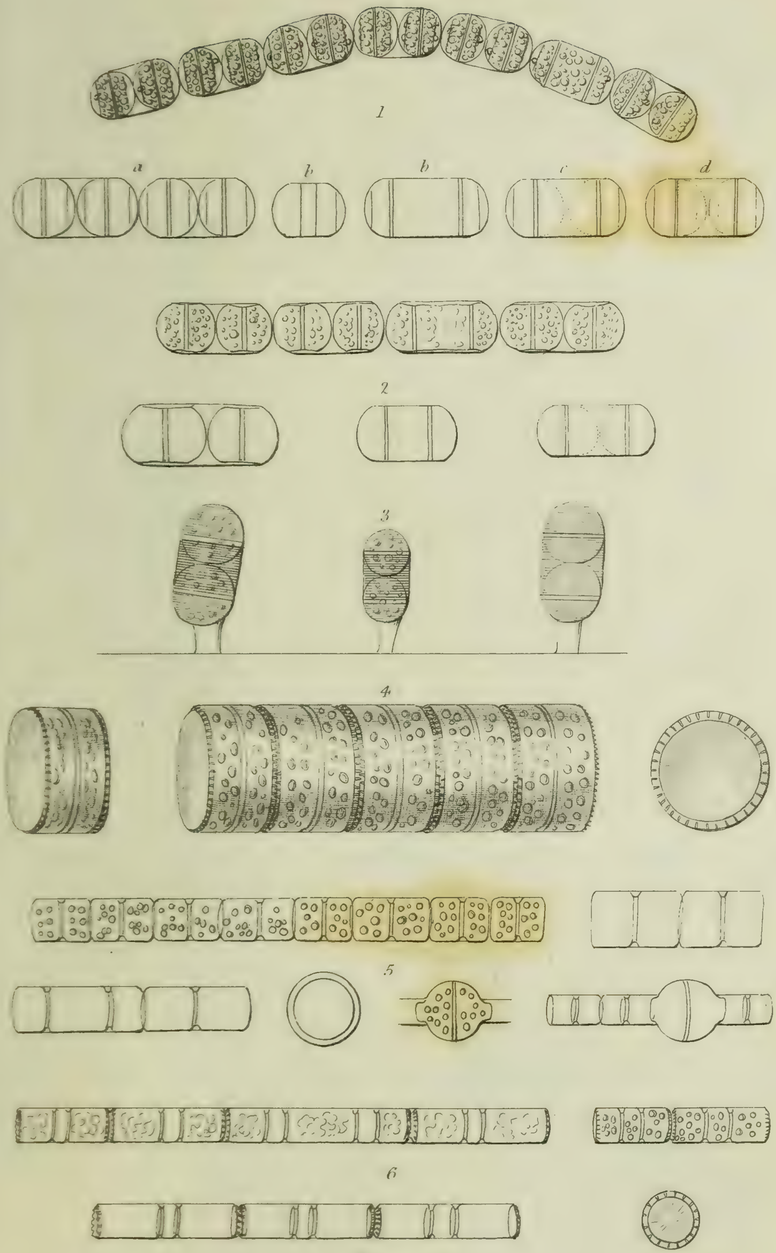

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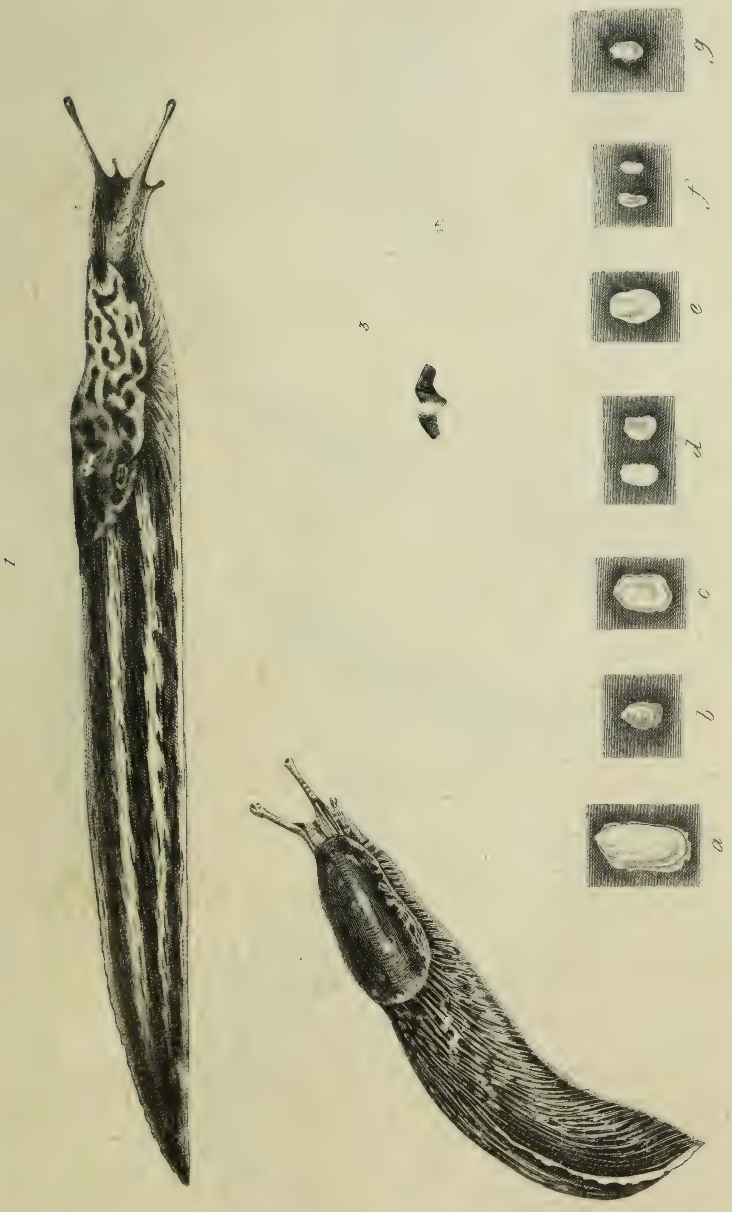
Jno. Ralfs, delin. J. D. C. Sowerby, fc.



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Engraved by A. T. Aikman.

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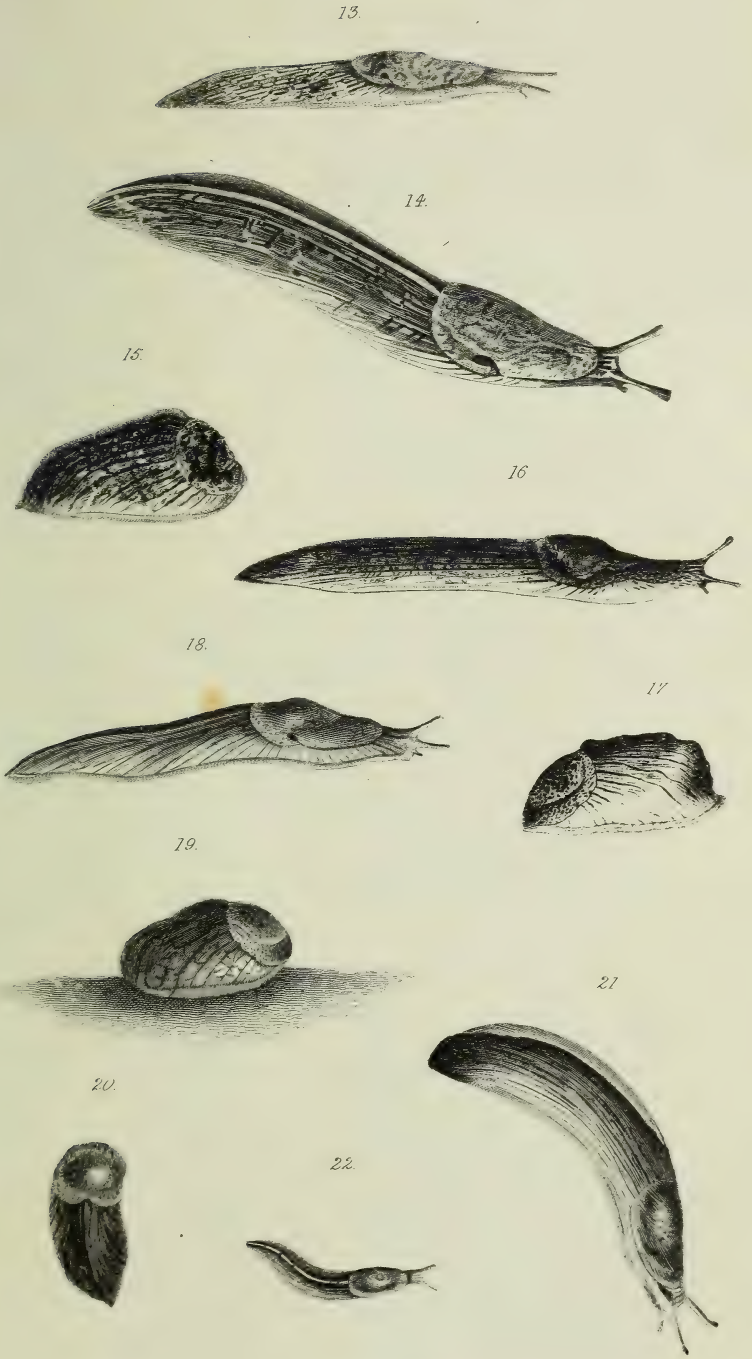

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STRUCTURE OF SHELLS.

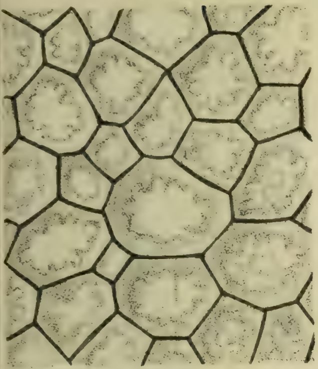

Fig. 1
Decalcified membrane of Pinna.

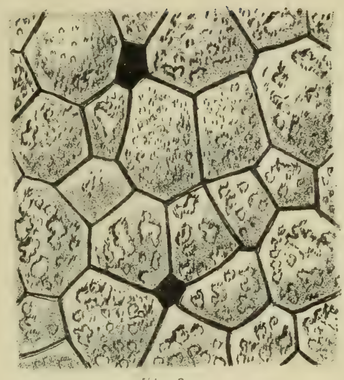

Fig. 2.
Section of Shell of Pinna.

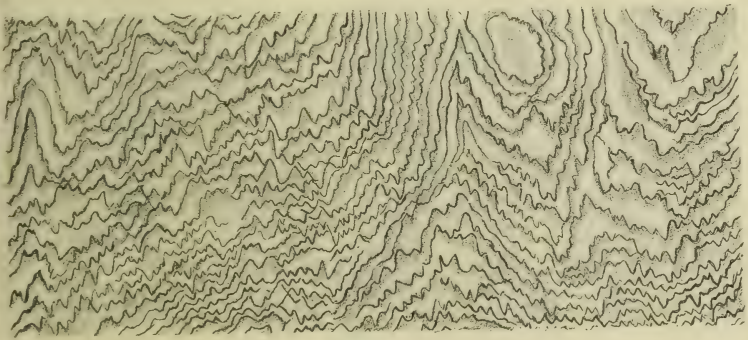

Fig. 3.
Section of Nacre.

Fig. 4.
Section of Avicula (?) longicostata.

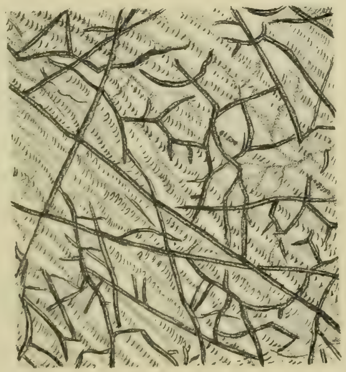

Fig. 5.
Section of Lima rudis.

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prel. lith. Linn. imp.
8, King William St. Strand

STRUCTURE OF SHELLS.

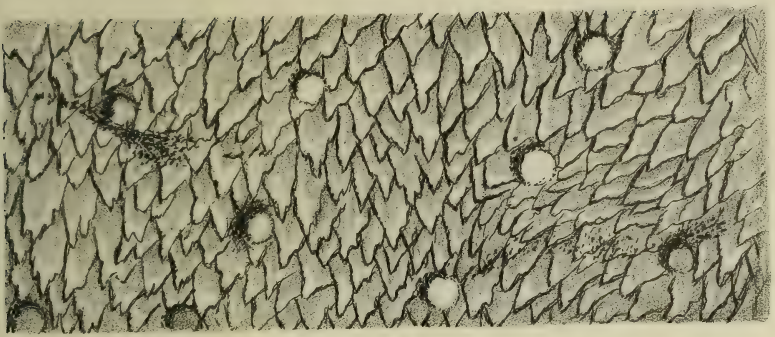


Fig. 6.

Section of Terebratula *(recent.)*

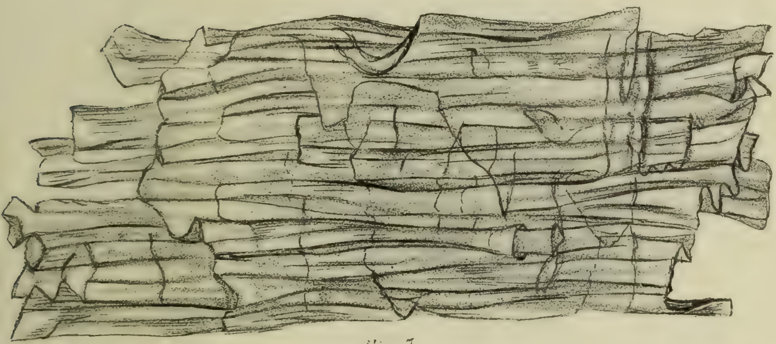


Fig. 7.

Shred of Terebratula (?), *fossil.*

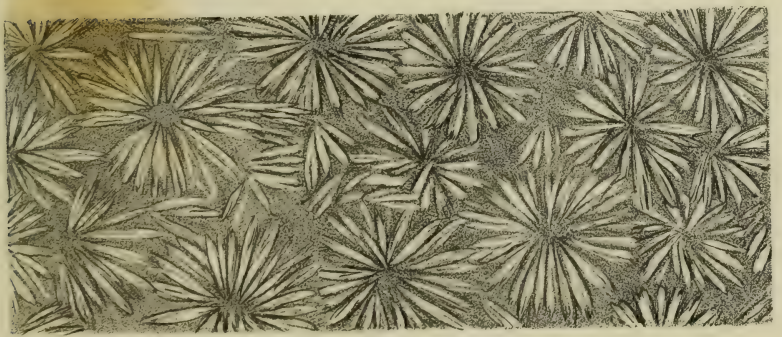
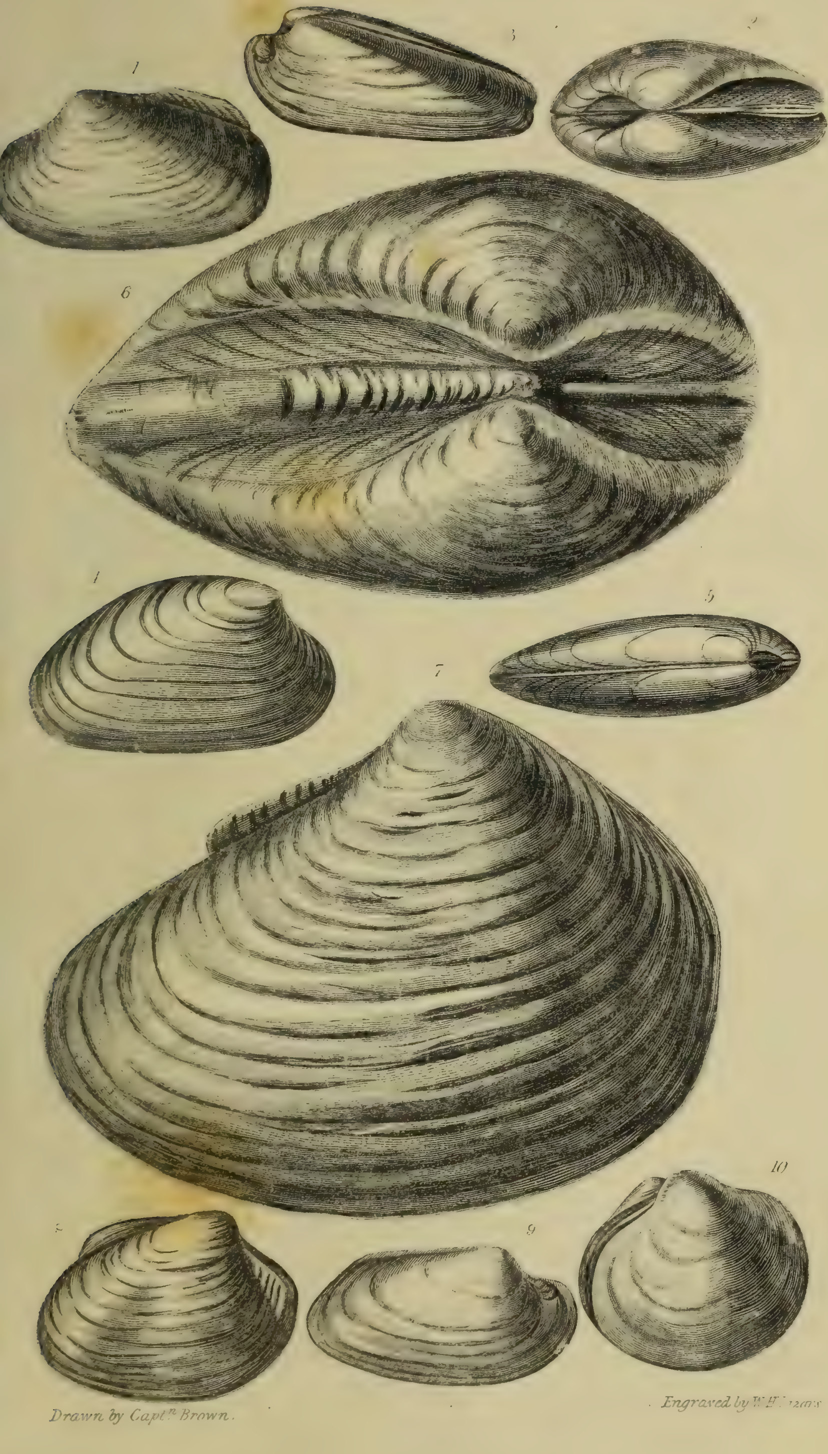


Fig. 8.

Section of Tooth of Mya arenaria.

, del et lith.

prel. lith. Linn. imp
8. King William St. Strand



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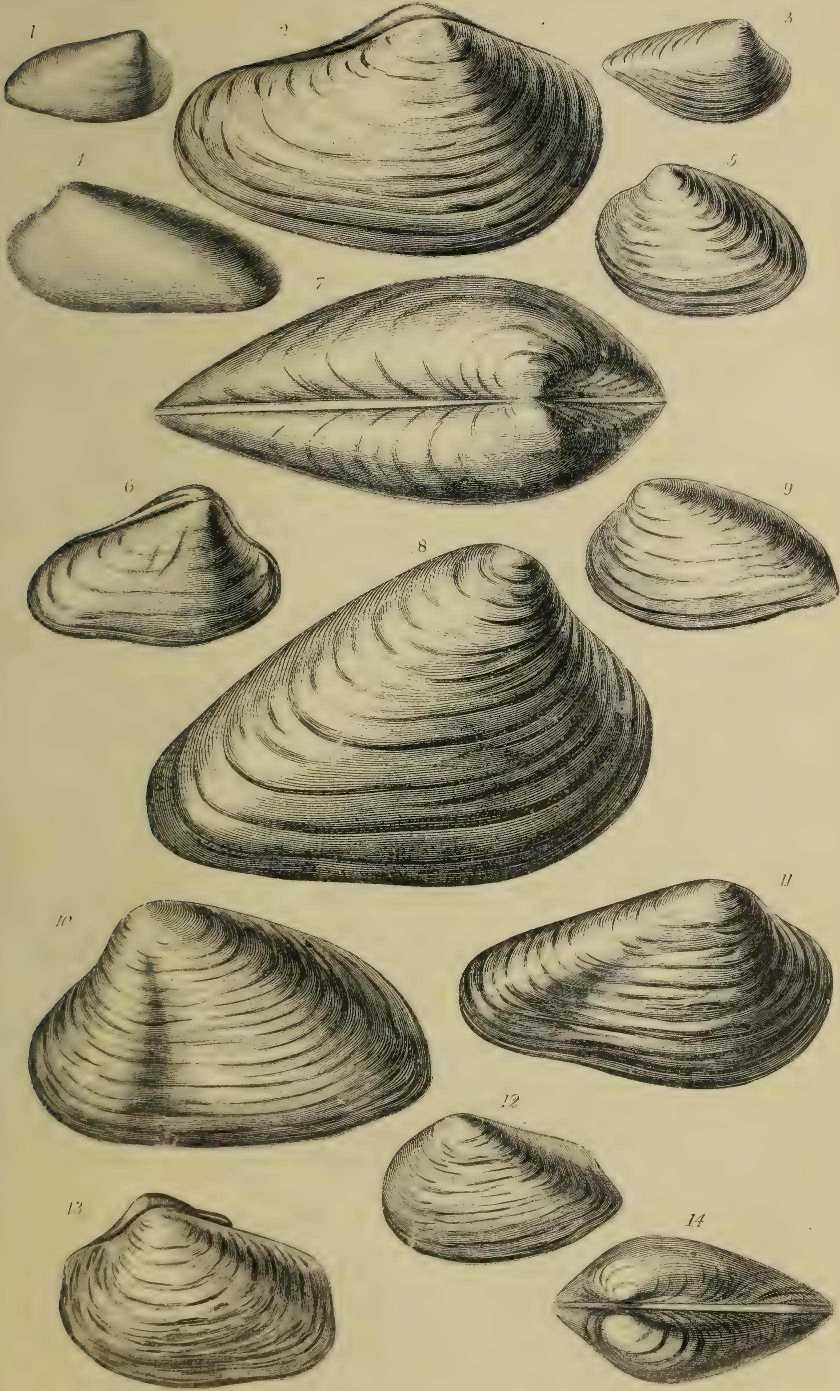

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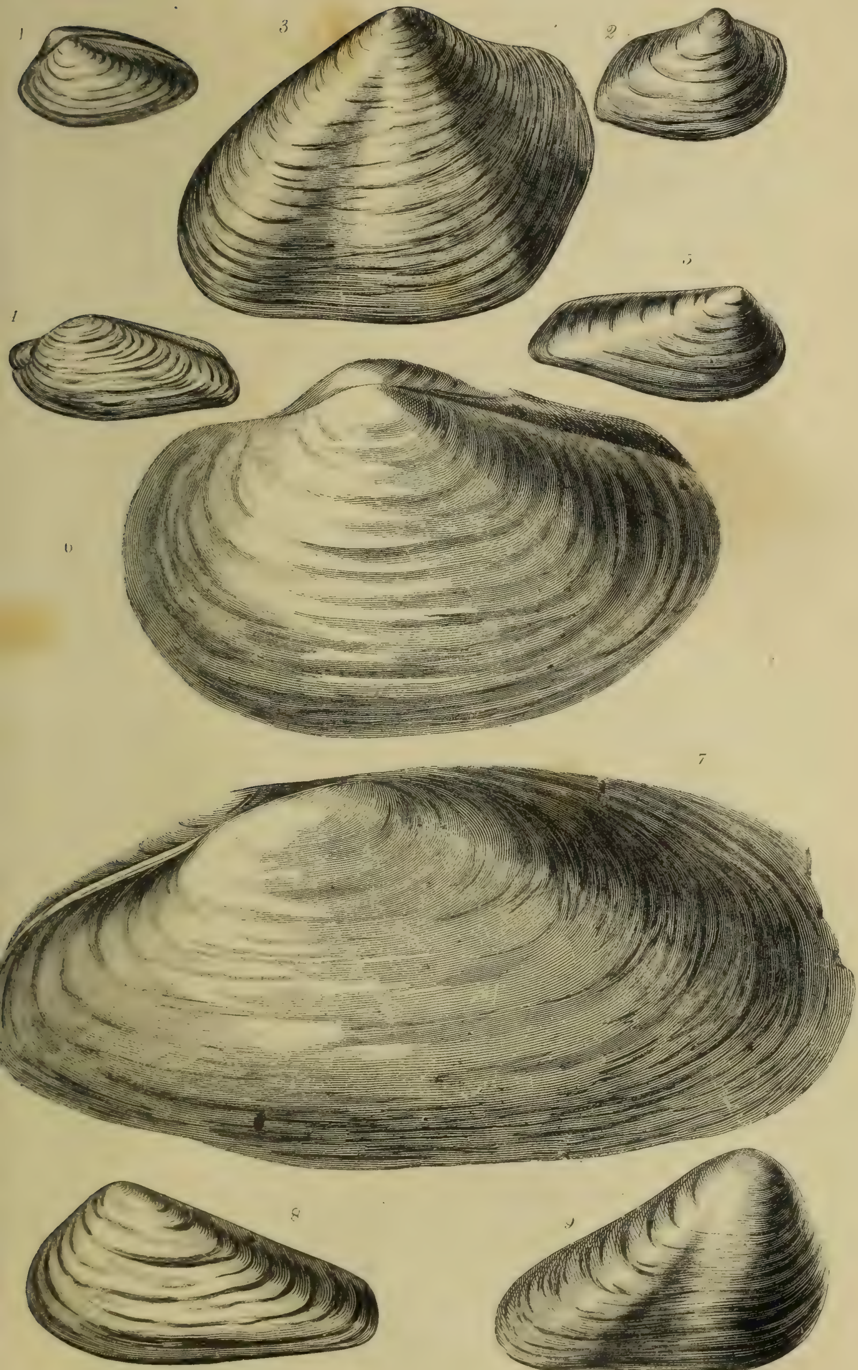

Drawn by Captn. Brown

Engraved by W. H. Lizars.

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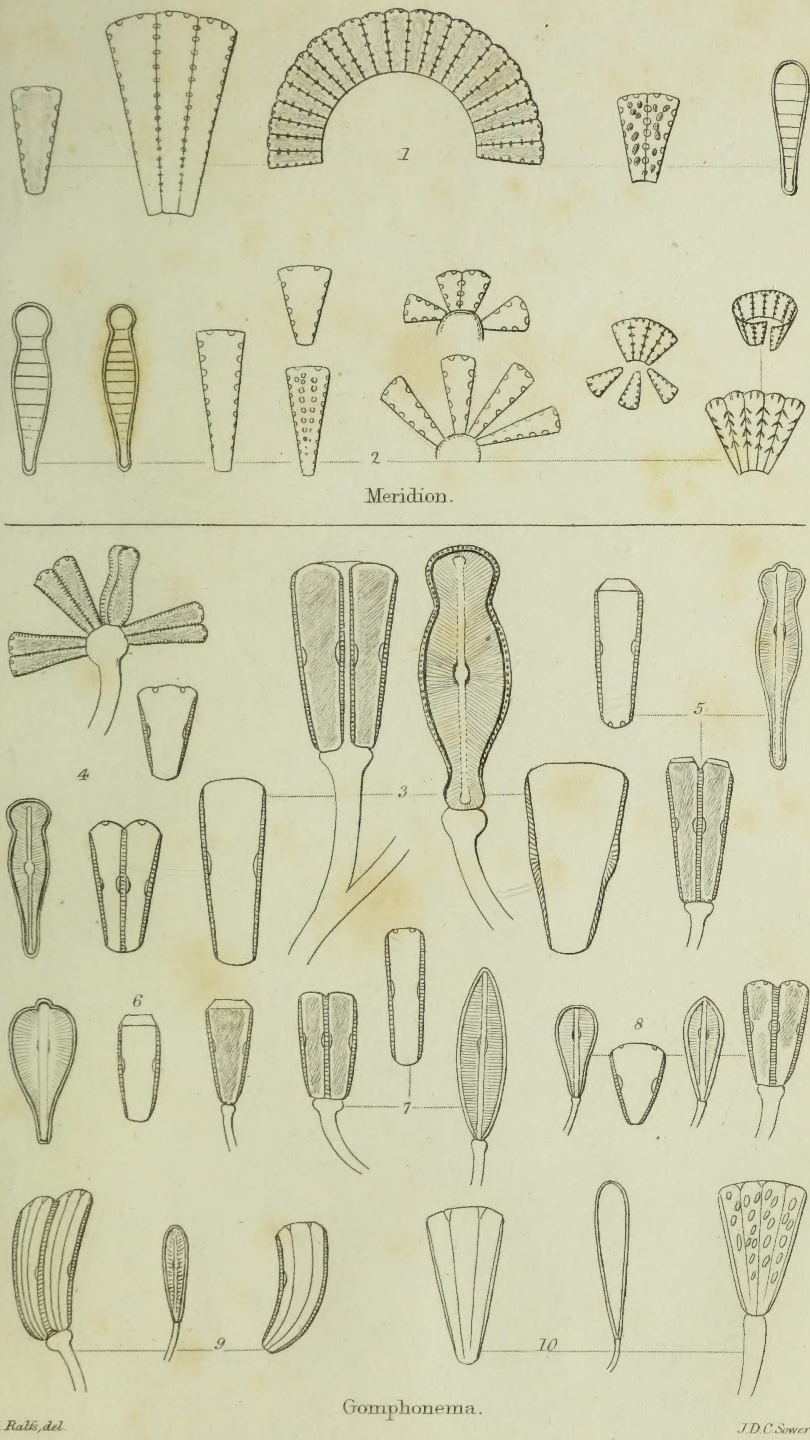

Jno Ralfs, del. J.D.C. Sowerby, fc.